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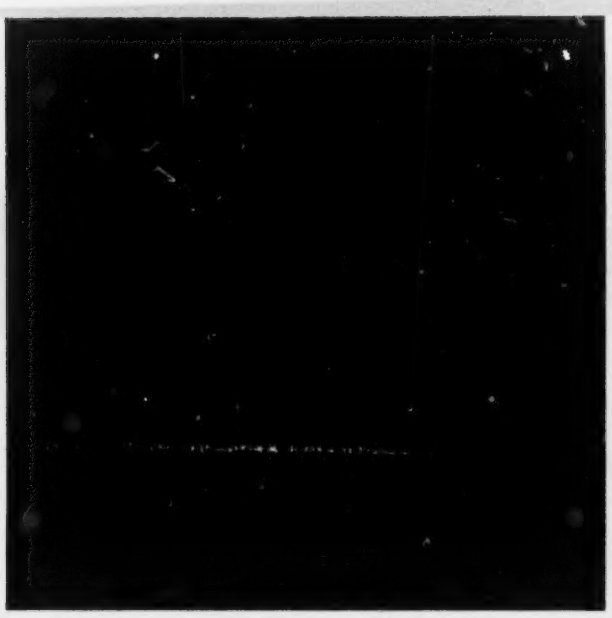
ABSTRACT

This report summarizes the results of the National Science Foundation's 1970 survey of scientific activities of independent nonprofit institutions. Data on the employment of scientists, engineers, and technicians, on expenditures, and on the R&D performance in the entire independent nonprofit sector are presented in section 1. Sections 2 and 4 focus on the employment of scientific manpower, on expenditures, and on research and development in research institutions, nonprofit-administered federally funded R&D centers, and voluntary hospitals, respectively. Section 5 provides information on a residual group of independent nonprofit organizations engaged in R&D performance, including a number of societies and academies of science, science exhibitors, private foundations, and other nonprofit organizations not elsewhere classified. (Author/AF)



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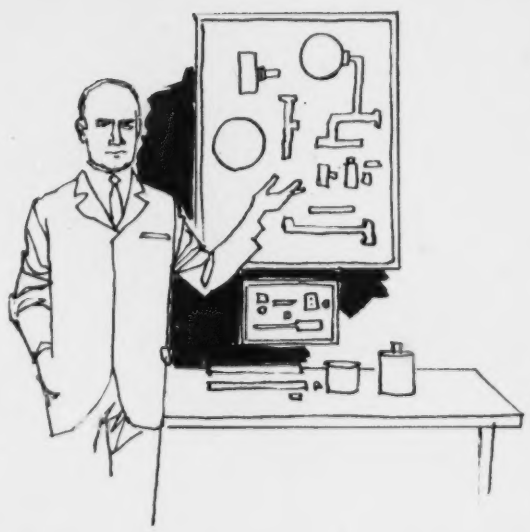

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General Notes

- Independent nonprofit institutions, as defined for this survey, are legal entities organized or chartered to serve the public interest and are exempt from most forms of Federal taxation. The survey on which this report is based included nonprofit organizations whose intramural R&D expenditures were known or thought to total $100,000 or more in 1969. Surveyed organizations include research institutes, nonprofit-administered Federally Funded Research and Development Centers (FFRDC's), voluntary hospitals, private foundations, professional or technical societies and academies of science, science exhibitors, and other nonprofit organizations, not elsewhere classified (n.e.c.).
- This report does not include hospitals and science exhibitors operated by State or local governments. The intramural R&D expenditures of these institutions are estimated to have totaled $84 million in 1969.
- Statistics shown in this report may not add to totals or subtotals because of rounding.
- For detailed definitions, see instructions in appendix C.

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Scientific Activities of Independent Nonprofit Institutions

1970

Report on a Survey of 1970 Employment and 1969 Expenditures

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Foreword

THE R&D SERVICES that independent nonprofit research institutions perform for government, industry, charitable organizations, and private donors evoke considerable public interest. Such institutions possess the adaptability, flexibility, and dynamism to be at the forefront of scientific development of new products and processes in such fields as space exploration, atomic energy, health, welfare, and education. Their R&D efforts tend to be closely linked with R&D interests and objectives of close concern to the general public. One of the reasons for this, of course, is that the tax-exempt status of nonprofit institutions obliges them to direct their activities toward social, charitable, or educational purposes

Since the early 1950's the R&D programs of nonprofit institutions have grown at a faster rate than those in other sectors of the economy. This growth resulted principally from the Federal Government's greatly increased utilization of the R&D services of such institutions, particularly research institutes, nonprofit-administered FFRDC's, and hospitals. As might be expected from the overall patterns of Federal R&D support, nonprofit institutions experienced sizable annual increases in R&D expenditures during 1953–66, but greatly curtailed rates of growth in recent years, 1966–69. In assessing the impact of recent policy shifts regarding Federal and other R&D spending on the U.S. economy, it is essential to have up-to-date statistical information on the characteristics of R&D performance in independent nonprofit institutions as well as in other sectors.

This report summarizes the results of the National Science Foundation's 1970 survey of scientific activities of independent nonprofit institutions. Compared with previous NSF surveys of the nonprofit sector, the 1970 survey was less comprehensive in that it excluded scientific activities funded by nonprofit institutions, but performed by other organizations. On the other hand, it was broader in coverage in that it included voluntary nonprofit hospitals. This survey is part of a series of periodic NSF studies covering all sectors of the U.S. economy that are designed to yield economic data on the Nation's investment in science and technology.

This report was prepared in the Office of Economic and Manpower Studies, Thomas J. Mills, Head. The National Science Foundation gratefully acknowledges the cooperation of officials of independent nonprofit organizations who supplied the survey data.

CHARLES E. FALK
Director, Division of Science Resources and Policy Studies

FEBRUARY 1971.

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Acknowledgments

This report was prepared in the Office of Economic and Manpower Studies, Division of Science Resources and Policy Studies, under special guidance of Kenneth Sanow, Head, Statistical Surveys and Reports Section. The survey was conducted and the report published under the direction of Joseph H. Schuster, Study Director, Universities and Nonprofit Institutions Studies Group. Major responsibility for coordination and final review was taken by Ronald S Biggar, Jr. Lester Friedman, assisted by James G. Huckenpahler, prepared the report.

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Highlights

- Independent nonprofit institutions employed 23,700 scientists and engineers in January 1970, down from the 25,600 employed in 1967. This downward shift in employment resulted from two principal factors: The shift of several large research institutes from the nonprofit sector to other sectors of the economy and the slackened rate of increase in R&D activities experienced by many nonprofit institutions during 1966–69.

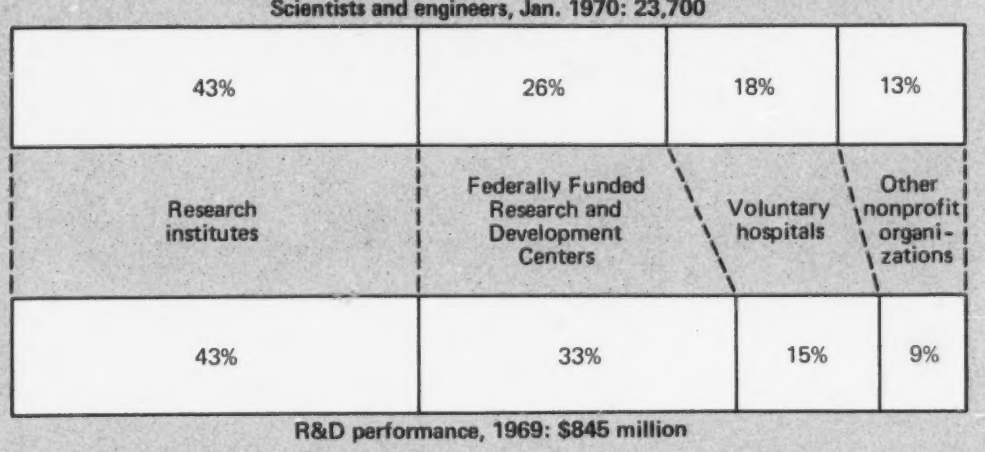
- Life scientists with one-third of the total comprised the largest occupational group, followed by engineers with 22 percent.

- Current expenditures for R&D performance amounted to $845 million in 1969, an actual increase of 6 percent; but in terms of constant dollars, of only 1.9 percent per year over the amount reported in 1966.

- The $607 million in federally financed R&D performance in 1969 represented an annual increase of 5.4 percent, but in terms of constant dollars, of only 1.3 percent over the total for 1966.

- Research institutes and nonprofit-administered Federally Funded Research and Development Centers (FFRDC's) together accounted for more than two-thirds of the scientists and engineers and about three-fourths of the intramural R&D expenditures. (See chart.)

Scientists and engineers and R&D performance of independent nonprofit institutions



Source: National Science Foundation (tables 1 and 2)

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- Of the 426 surveyed institutions, the 20 with the largest R&D programs accounted for 59 percent of total R&D expenditures.

- Life sciences and engineering accounted for the largest proportion of R&D funds in 1969, each comprising more than 30 percent of the total.

- Institutions located in the Pacific division employed 26 percent of the scientists and engineers and accounted for 32 percent of the R&D performance in the nonprofit sector.

Introduction

THE GROWING PUBLIC AWARENESS and acceptance of the importance of science and technology in the post-World War II era has been responsible for the considerable increase in the number and size of independent nonprofit research institutions, as well as in the broadening of their R&D activities. Such organizations perform important services for government agencies as well as for private industry by providing technological advice and performing research on specific problems. The independent character of these nonprofit research institutions has had a significant effect on the growth and diversification of their research operations, for they are not necessarily committed to, nor oriented toward, the policies of any one company or government agency. For this reason, these institutions are free to establish their own objectives and employ researchers and managerial personnel at existing market rates. Thus they are able to acquire the managerial and technical know-how essential in attracting research contracts from both public and private organizations.

Most of the organizations with large R&D programs are in the research institute and nonprofit-administered Federally Funded Research and Development Center (FFRDC) categories.[1] Their large size enables them to maintain a multidisciplinary staff and thus contribute toward the solution of a multiplicity of problems. Many of their scientific achievements have already had a stimulating effect on the civilian economy. For example, the Battelle Memorial Institute was largely responsible for the development of electrostatic copying. Similarly, magnetic tape recording, the hypersonic shock tunnel, and printed magnetic characters for the processing of financial and other records were among the many scientific contributions that resulted from research performed at IIT Research Institute, Cornell Aeronautical Laboratory, and Stanford Research Institute, respectively. At present, an increasing number of nonprofit institutions are directing their resources towards the solution of social and environmental problems, such as alcoholism, drug addiction, crime prevention, overpopulation, malnutrition, health care, pollution control, and urban development.

Nonprofit-administered FFRDC's further the missions of their sponsoring Federal departments and, to an increasing degree, are providing technological advice and research services to industry and State and local governments. Centers such as Aerospace Corp. and MITRE Corp. perform defense-related research and development under sponsorship of the Department of Defense (DOD). The Pacific Northwest Laboratories carries out R&D projects related to the civilian nuclear power portion of the Atomic Energy Commission's (AEC's) program. And the U.S. Office of Education (OE) finances a network of regional educational laboratories charged with

[1] See pages 11–15 for principal characteristics of FFRDC's.

the responsibility of improving education through research and development.

Summary data on the employment of scientists and engineers and on R&D performance in the entire independent nonprofit sector are presented in section 1 of the report. The subsequent sections 2 through 4 focus attention on research and development in research institutes, nonprofit-administered FFRDC's, and voluntary hospitals, respectively. Section 5 provides data on a residual group of independent nonprofit organizations engaged in R&D performance, including a number of societies and academies of science, science exhibitors, private foundations, and other nonprofit organizations, not elsewhere classified (n.e.c.).

SECTION 1. General Characteristics of the Scientific Activities of Independent Nonprofit Institutions

THE EMPLOYMENT CHARACTERISTICS of nonprofit institutions are as diverse as the types of activities carried out within the sector. Some organizations are heavily research-oriented, while others allocate a relatively small part of their funds to such activities. For example, nonprofit-administered Federally Funded Research and Development Centers (FFRDC's) are largely engaged in the performance of federally financed R&D work and therefore employ more than one-half their total staff directly on R&D projects. Voluntary hospitals, in contrast, employ only 3 percent of their staff directly on R&D projects, since patient care and teaching are their principal functions. For the nonprofit sector as a whole, only 11 percent were primarily engaged in R&D performance. However, in institutions with over $5 million in R&D expenditures, R&D scientists, engineers, and technicians combined comprised 36 percent of total employment (appendix table B–1).

Scientists and Engineers

Surveyed nonprofit institutions employed 23,700 scientists and engineers in January 1970. This was an increase of 2,400 over the number employed in January 1965, but below the 25,600 employed in 1967 (appendix table B–2). The recent reduction in employment was caused more by organizational shifts between sectors than by reduced scientific activities. In fact, the shifting of Mellon Institute and Woods Hole Oceano-

TABLE 1.—*Total number of scientists and engineers employed in independent nonprofit institutions, by primary function, field of employment, level of educational attainment, and type of institution, January 1970*

	Total	Research institutes	FFRDC's[a]	Voluntary hospitals	Other nonprofit organizations[b]
Total	23,652	10,105	6,057	4,331	3,159
Primary function:					
Research and development	21,556	9,692	6,057	3,911	1,896
Other activities (non-R&D)	2,096	413	----	420	1,263
Field of employment:					
Engineers	5,208	2,294	2,629	116	169
Physical scientists	3,669	1,874	1,053	176	566
Mathematicians	1,499	535	759	39	166
Life scientists	8,008	3,179	153	3,556	1,120
Psychologists	1,412	555	281	224	352
Social scientists	3,856	1,668	1,182	220	786
Educational attainment:					
Ph. D. or Sc.D.	6,601	3,080	1,341	1,036	1,144
M.D., D.D.S., etc.	3,098	723	54	2,015	306
Master's	6,115	2,636	2,195	503	781
Bachelor's or the equivalent	7,838	3,666	2,467	777	928

[a] Federally Funded Research and Development Centers administered by nonprofit organizations.

[b] Includes societies and academies of science, science exhibitors, foundations, and other nonprofit organizations not elsewhere classified (n.e.c.).

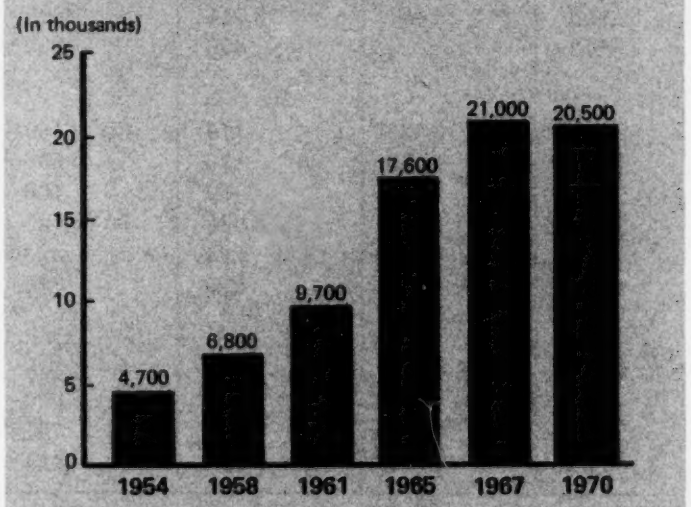
graphic Institute to the university and college sector and Systems Development Corporation to the industry sector more than accounted for the employment decrease.

Since the survey was limited to institutions with intramural R&D programs, it was not surprising that 91 percent of the scientists and engineers were primarily engaged in R&D performance. As might be expected, research institutes and nonprofit-administered FFRDC's employed the largest number of R&D scientists and engineers, together accounting for nearly three-fourths of the sector total (table 1).

Scientific and engineering employment was concentrated among relatively few organizations. The four largest institutions in terms of current R&D performance employed one-fourth the R&D scientists and engineers in the sector in 1970 (appendix table B–3). The 20 leading institutions accounted for more than one-half of professional R&D employment. The fact that four of the eight largest organizations in the sector were nonprofit-administered FFRDC's emphasizes the importance placed on the R&D services of these nonprofit organizations by the Federal Government.

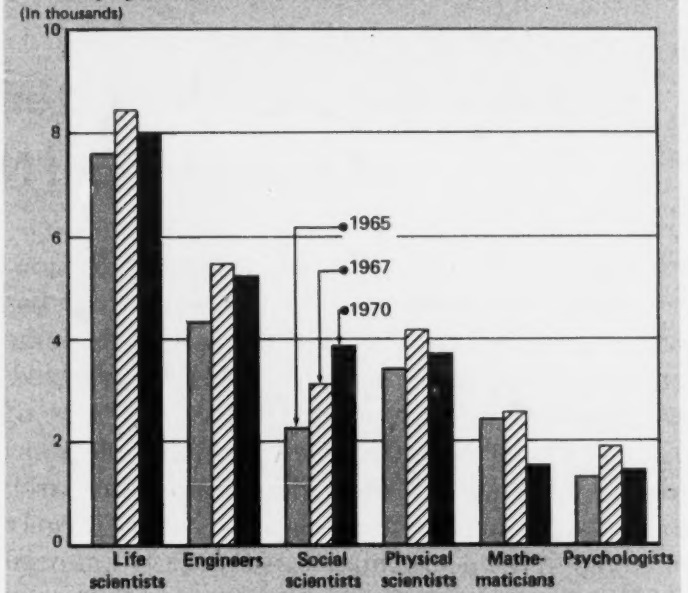
Nonprofit institutions were characterized by a considerable growth in the employment of full-time-equivalent R&D scientists and engineers from 1954 to 1965. The annual increase during the 11-year period amounted to 12.8 percent.

Chart 1. FTE[a/] scientists and engineers engaged in R&D in independent nonprofit institutions, selected years, 1954-70



a/ Full-time equivalent.
Source: National Science Foundation.

Chart 2. Employment of scientists and engineers in independent nonprofit institutions, by field of employment, January 1965, 1967, and 1970



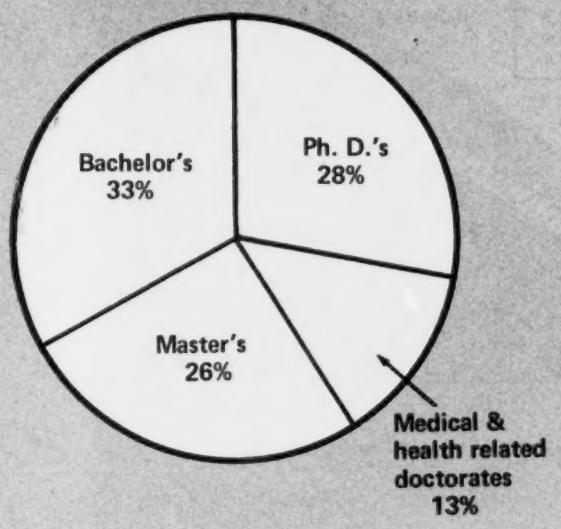
Source: National Science Foundation (appendix table B-2).

Growth continued at 9.2 percent per year between 1965 and 1967, but subsequently, due to both sectoral shifts and a slowdown in the growth of Federal R&D support, ceased completely (chart 1).

The distribution of scientists and engineers by field of employment shows that life scientists, with one-third of the total, comprised the largest occupational group (chart 2). Voluntary hospitals, as expected, employed the largest number, followed closely by research institutes (appendix table B-4). Together, these two institutional types employed 84 percent of the 8,000 life scientists in the nonprofit sector. Engineering employment ranked second with 22 percent of the total. Social scientists increased their share of professional scientific and engineering employment, from 11 percent of the total in 1965 to 16 percent in 1970. Physical scientists were fourth with just under 16 percent. Mathematicians and psychologists comprised the smallest occupational groups, each accounting for 6 percent.

The educational attainment level of scientists and engineers was relatively high among all types of nonprofit organizations with two-thirds of the scientists and engineers holding advanced degrees (appendix table B–5 and chart 3). Personnel holding Ph. D.'s, master's, and bachelor's degrees were most numerous in research insti-

Chart 3. Distribution of scientists and engineers in independent nonprofit institutions, by level of educational attainment, January 1970



Source: National Science Foundation (appendix table B-5)

tutes, while voluntary hospitals employed the most medical doctorates. The proportion of doctorate degree-holders working in institutions with less than $5 million in R&D performance was especially high, 55 percent. Employment in the largest institutions (R&D expenditures in excess of $5 million), on the other hand, consisted primarily of bachelor's degree-holders, 40 percent, and those with master's degrees, 32 percent.

Although surveyed institutions were located in all sections of the country, those with the largest R&D programs were concentrated in densely populated areas. Institutions located in the Pacific division employed 26 percent of the total number of scientists and engineers (appendix table B–6). The Middle Atlantic and East North Central divisions ranked next with 24 percent and 13 percent, respectively. Together, these three divisions accounted for two-thirds of nonprofit scientific and engineering employment. Institutions in the highly urbanized States of California, New York, and Massachusetts together employed one-half the scientists and engineers, although they comprised only one-third the number of surveyed institutions.

The 15 States leading in R&D expenditures accounted for more than nine-tenths of total nonprofit employment. The presence of the State of Washington among the leaders was largely due to the operation of Pacific Northwest Laboratories within the State. The District of Columbia owes its high ranking to the more than 30 medium- to large-sized nonprofit organizations located in the Federal City (appendix table B–7).

Technicians

Surveyed nonprofit institutions employed 25,400 technicians in January 1970. Voluntary hospitals, with 72 percent of the total, were dominant in the area of technician employment.

R&D technicians comprised 39 percent of total technician employment. Research institutes employed the largest nmber in this functional category, with voluntary hospitals ranking second (appendix table B–8). The field distribution of R&D technicians showed the influence of hospital employment, as life science technicians accounted for 59 percent of the R&D total. Engineering and physical science technicians primarily employed by research institutes and nonprofit-administered FFRDC's ranked second with one-third of the total. Social science technicians accounted for the remaining 8 percent.

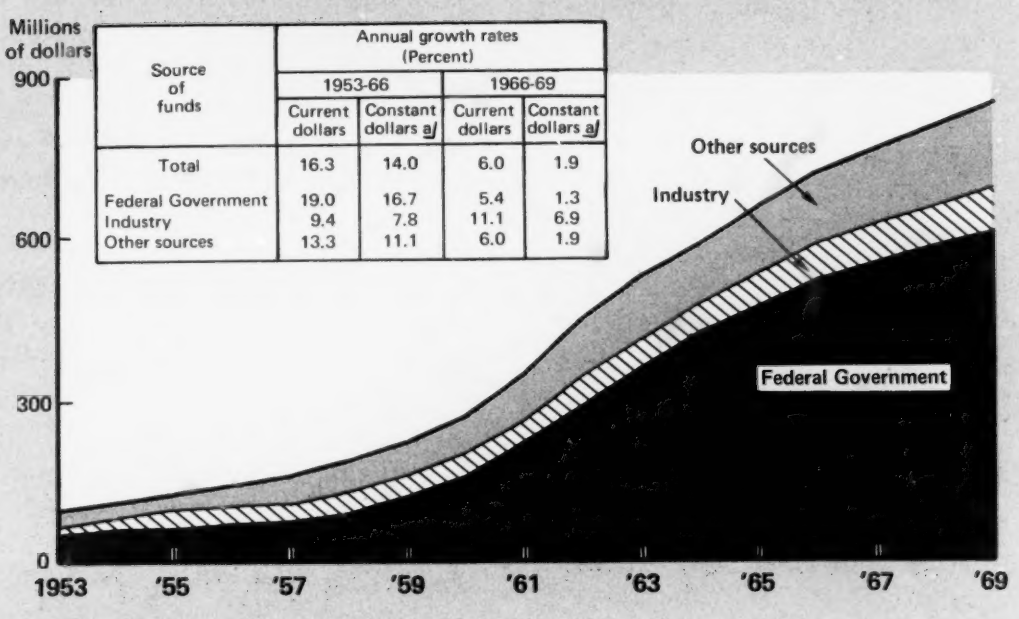
Technicians, like scientists and engineers, were heavily concentrated in the urban centers of the country. The Middle Atlantic Division, with several large patient care and research facilities in New York and Pennsylvania employed 29 percent of the total (appendix table B–6). Other States employing large numbers of technicians included Massachusetts, California, and Ohio. Together, the five States mentioned above employed 59 percent of the technicians working in surveyed nonprofit institutions.

Intramural R&D Performance

Independent nonprofit institutions reported expenditures of $845 million for R&D performance in 1969, nearly 8½ times the $100 million allocated in 1953 (appendix table B–9). Most of this increase was attributable to the sizable growth of Federal R&D support—19.0 percent per year between 1953 and 1966. During this period the federally financed share of current R&D expenditures grew from a low of 52 percent of the nonprofit total in 1957 to a high of 74 percent in 1964.

Chart 4. Trends in intramural R&D expenditures of independent nonprofit institutions, by source of funds, 1953-69

Source of funds	Annual growth rates (Percent)			
	1953-66		1966-69	
	Current dollars	Constant dollars a/	Current dollars	Constant dollars a/
Total	16.3	14.0	6.0	1.9
Federal Government	19.0	16.7	5.4	1.3
Industry	9.4	7.8	11.1	6.9
Other sources	13.3	11.1	6.0	1.9



a/ Constant dollars based on the U.S. Department of Commerce's GNP implicit price deflator.

Source: National Science Foundation (appendix table B-9)

Since 1966, however, research and development in the nonprofit sector has shown a reduced rate of growth, expanding at an annual rate of 6.0 percent. This was primarily due to the reduced rate of growth in financial support from the Federal Government. The $607 million in federally financed R&D performance in 1969 represented an annual increase of 5.4 percent over the $519 million reported in 1966 (chart 4). The reduced rate of growth in R&D performance is accentuated further when the declining value of the dollar is considered. In terms of constant dollars, based on the U.S. Department of Commerce's GNP implicit price deflator, the 1966–69 growth in total R&D expenditures averaged only 1.9 percent per year, while Federal R&D support increased at an annual rate of only 1.3 percent.

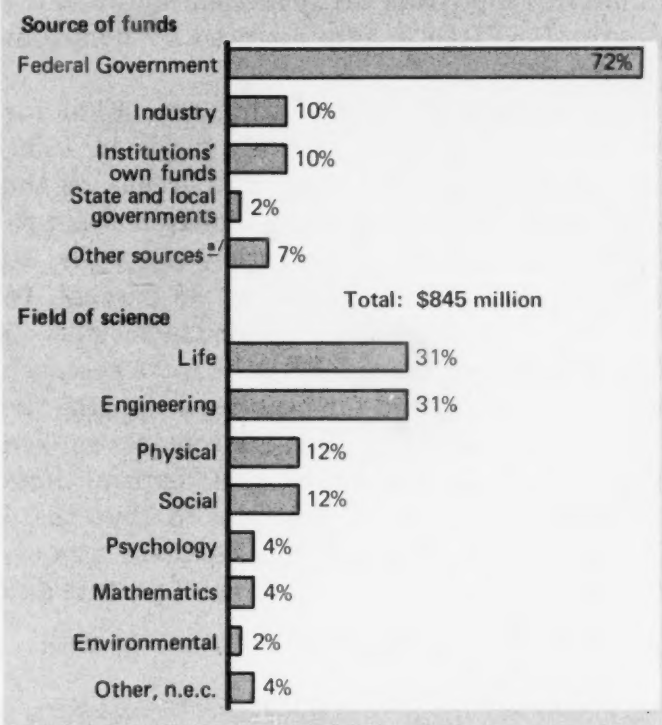
In addition to the reduced growth in Federal R&D support, nonprofit institutions experienced only a slight increase—0.7 percent per year during 1966–69—in the amount of their own funds used for R&D performance. Reduced earnings from investments, increased overhead costs, and a general drying up of unrestricted contributions are a few of the factors limiting the volume of own funds available for R&D activities (appendix table B–10).

Many institutions are trying to attract more support from industry and State and local government agencies, and these sources of support have shown steady growth in recent years. For example, industry R&D support increased 12.9 percent between 1964–66 and 11.1 percent per year between 1966–69. Although State and local government R&D support was small in comparison with the other sources mentioned above, its rate of growth was greatest—27 percent per year between 1964–66 and 29 percent per year during 1966–69. The magnitude of the increase in non-Federal R&D support, however, has been too small to offset recent leveling trends in Federal R&D support (appendix tables B–9 and B–10).

The pattern of R&D concentration exhibited by nonprofit institutions in 1969 did not differ much from that observed in 1966 and 1964 (appendix table B–12). The 20 institutions with the largest R&D programs accounted for 59 percent of the R&D total in 1969, as compared with 58 percent in 1966 and 60 percent in 1964. Federal funds, however, were more heavily concentrated, since the preponderance of Federal support went to nonprofit-administered FFRDC's and large research institutes. In 1969, the top 20 institutions, in terms of R&D performance, received 65 percent of total Federal R&D support to nonprofit institutions. It is significant to note, however, that this concentration has dropped from 69 percent in 1964 and 67 percent in 1966 as these institutions feel the effects of reduced growth in Federal support.

Research institutes, although ranking first in the volume of R&D performance, continued to lose ground to nonprofit-administered FFRDC's in this area (table 2). In recent years, the research institute share of current R&D expenditures had decreased—from a high of 47 percent in 1964 to 43 percent in 1969. Nonprofit-administered FFRDC's, on the other hand, have increased their share from 29 percent of the R&D

Chart 5. Distribution of current expenditures for R&D performance in independent nonprofit institutions, 1969



a/ Includes foundations, voluntary health agencies, and other sources.
Source: National Science Foundation (table 2).

TABLE 2.—*Current expenditures for intramural R&D performance of independent nonprofit institutions, by source of funds, field of science, and type of institution, 1969*

[Dollars in thousands]

Source and field	Total R&D	Research institutes	FFRDC s [a]	Voluntary hospitals	Other nonprofit organizations [b]
Total	$845,299	$361,019	$277,314	$130,246	$76,720
Source of funds:					
Federal Government	606,595	224,379	262,564	84,228	35,424
State governments	10,795	7,265	477	1,723	1,330
Local governments	6,059	2,430	2,912	193	524
Foundations	28,431	12,744	1,423	9,069	5,195
Voluntary health agencies	8,297	4,255	-------	3,890	152
Industry	81,272	73,566	3,419	1,773	2,514
Institution's own funds	81,484	25,904	5,003	24,222	26,355
Other sources	22,366	10,476	1,516	5,148	5,226
Field of science:					
Engineering	257,697	113,648	138,459	153	5,437
Physical sciences	103,743	47,990	46,561	2,137	7,055
Environmental sciences	16,770	8,293	5,045	79	3,353
Mathematics	35,401	14,252	20,195	738	216
Life sciences	265,967	101,073	14,073	123,166	27,655
Psychology	29,843	14,741	5,717	3,192	6,193
Social sciences	99,931	53,724	32,049	415	13,743
Other sciences, n.e.c.	35,947	7,298	15,215	366	13,068

[a] Federally Funded Research and Development Centers administered by nonprofit organizations.

[b] Includes societies and academies of science, science exhibitors, private foundations, and other nonprofit organizations not elsewhere classified.

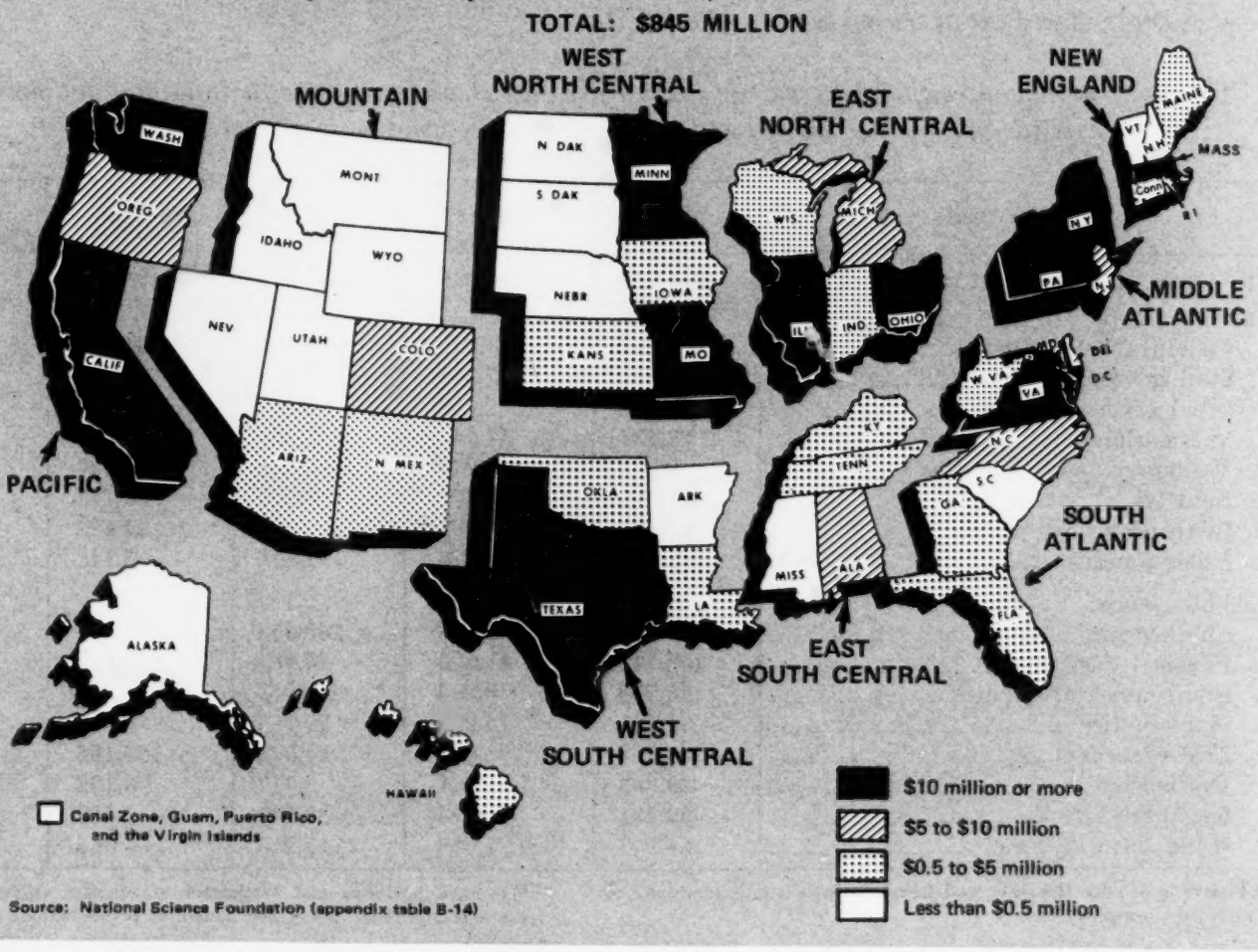
total in 1964 to 33 percent in 1969. The inclusion of Pacific Northwest Laboratories in 1966[2] with R&D expenditures amounting to over $33 million, and its rapid growth since then—$63 million in 1969—was the principal factor in the growth of FFRDC's administered by nonprofit organizations.

Life sciences and engineering accounted for the largest proportion of R&D funds in 1969, each comprising more than 30 percent of the total (chart 5). Life sciences research was primarily concentrated in voluntary hospitals, 46 percent, and research institutes, 38 percent. In the case of engineering, 10 organizations—5 nonprofit-administered FFRDC's and 5 research institutes—accounted for nearly nine-tenths the engineering R&D total. Physical sciences ranked third, but its proportion of R&D expenditures fell from 19 percent of the total in 1966 to 14 percent in 1969. Much of this decrease was attributable to the transfer of Mellon Institute and Woods Hole Oceanographic Institute to the university and college sector. Continued emphasis on social science research and development was reflected by an increase from 7 percent of the R&D total in 1964 to 12 percent in 1969. Mathematics and psychology were the other major fields designated in the survey; each made up about 4 percent of the total nonprofit R&D effort (appendix tables B–10 and B–13).

The geographic areas with large R&D expenditures were generally the same as those employing large numbers of scientists and engineers (chart 6). The Pacific division ranked first in both total and Federal R&D expenditures, with over one-third the U.S. total (appendix table B–14). The Middle Atlantic division ranked next with one-fifth the R&D performance. The East North Central, South Atlantic, and New England divisions each represented about 13 percent of the U.S. total. The remaining four geographic areas together accounted for less than 11 percent.

[2] Operated by the General Electric Co. prior to 1966.

Chart 6. Geographic distribution of current expenditures for R&D performance of independent nonprofit institutions, 1969



Source: National Science Foundation (appendix table B-14)

SECTION 2. Research Institutes

RESEARCH INSTITUTES accounted for the major share of R&D performance by organizations covered in the survey. For this study, a research institute was defined as a separately incorporated, independent nonprofit organization operating under the direction of its own controlling body whose primary function was the performance of research and development in the sciences and engineering.[3] The present survey covered 159 research institutes known or believed to have spent $100,000 or more on intramural R&D projects in 1969.

Research institutes engage in a wide variety of R&D activities. For instance, Stanford Research Institute (SRI), the largest research organization in terms of current R&D performance, has about 800 research projects underway at any one time. They range from "ballistic missile defense analysis" to "repellency and attractiveness of man to mosquito bites." SRI's R&D performance alone comprised 15 percent of the total for research institutes in 1969. Battelle Memorial Institute's research program embraces more than 600 studies, ranging from nuclear fission to urban sociology. Battelle's work traditionally has been "hardware" research, centered in the engineering and physical sciences. Now, however, it is moving increasingly into social sciences. For example, it has conducted studies on such social problems as alcoholism and ghetto schools. Battelle's R&D activities, excluding Pacific Northwest Laboratories, which was classified as a nonprofit-administered FFRDC in this survey, amounted to 13 percent of the current intramural and 32 percent of the capital R&D expenditures of all research institutes in 1969. The third-largest research institute, Cornell Aeronautical Laboratory, Inc. (CAL), engages in applied research in such fields as space research, weaponry, internal research, and transportation dynamics. CAL accounted for 9 percent of all research institutes R&D performance in 1969.

Numerous changes have occurred within the research institutes category during 1967–70. Among the most consequential changes were the merging of Mellon Institute with Carnegie Institute of Technology to form Carnegie-Mellon University; the transfer to the university sector of Woods Hole Oceanographic Institute; the shift of Systems Development Corp. from nonprofit to profit status; and the switch of the Education Development Center to the nonprofit FFRDC category. These shifts must be considered when comparing the 1967–70 trend data presented in this section.

The four institutions mentioned above accounted for almost one-fifth of the 12,400 scientists and engineers employed in January 1967 (appendix table B–15). The 2,300 decline in scientists and engineers at research institutes during the 1967–70 time frame was primarily due to the transfer of these organizations from the category. The increase in current R&D expenditures at research institutes during 1966–69 was minimal — 3.7 percent annually — indicating a slowdown or a reduction in "real" R&D performance had occurred.[4] The underlying reasons for this occurrence will be examined later in this section.

It is probable that further significant changes will occur within the research institutes category in the years ahead. Cornell Aeronautical Laboratory, for example, may be sold by Cornell

[3] Operating foundations primarily engaged in R&D performance were classified in the research institutes category in the 1966 report, National Science Foundation, *Scientific Activities of Nonprofit Institutions, 1966* (NSF 69–16) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, March 1969), pp. 12–16. Data for these organizations are now shown separately and can be found in sections 2 and 5 and in appendix C. Appropriate adjustments to trend data were made in all cases.

[4] Current intramural R&D expenditures of the four organizations amounted to more than $27 million in 1966.

University to a private profitmaking company. The effect of this action, insofar as the R&D performance of the research institutes category is concerned, would be equivalent to, if not greater than, the major shifts already mentioned.

Total Employment

Employment in all activities of the 159 surveyed research institutes totaled 24,300[5] in January 1970, a 1.8-percent annual decline from the 25,600 reported in 1967. The shift of the organizations mentioned earlier from the nonprofit research institutes category was primarily responsible for the decrease. Lower employment levels, however, also prevailed at several large research institutes. In fact, three of the four largest institutions recorded personnel losses during the 3-year period, and in the fourth, the increase was negligible. Of the three with losses, IIT Research Institute, with a 6.9-percent annual rate of decline, and SRI, with a 3.8-percent decrease, were most affected. Large research institutes, those in the $1 million or more R&D expenditure-size category, accounted for more than four-fifths of total employment in 1970 (appendix table B–1).

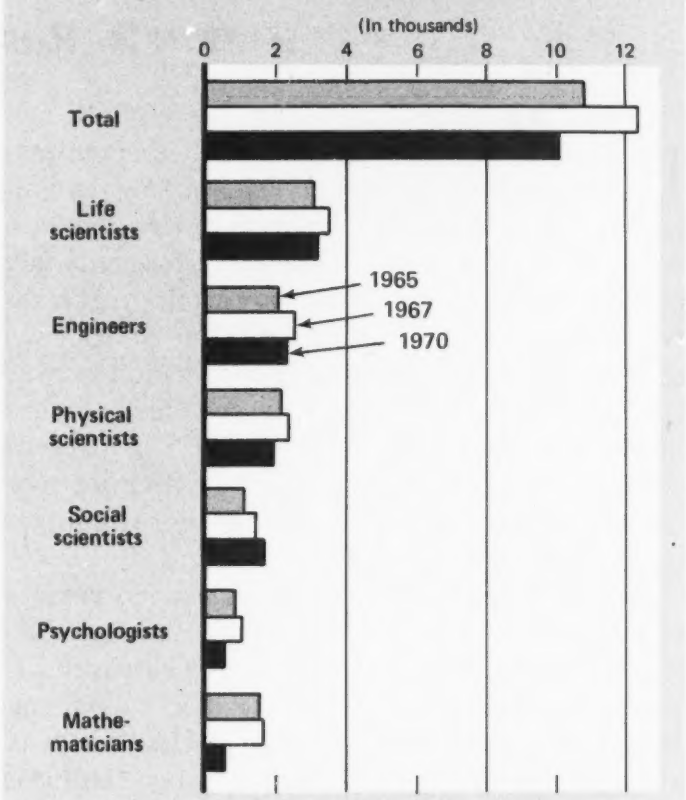
Scientists and Engineers

Growth in science and engineering employment fell from an annual rate of increase of 6.8 percent between 1965 and 1967 to a decline of 6.6 percent per year during 1967–70 (appendix table B–15). Again, it must be emphasized that the decline was due to significant shifts from the research institutes category. Minor reductions in the number of scientists and engineers employed were also reported by Stanford Research Institute, Battelle Memorial Institute, and IIT Research Institute during the period. Almost all, 96 percent, of the 10,100 scientists and engineers employed in 1970 were engaged in R&D projects (appendix table B–1).

Life scientists comprised the largest group of scientists and engineers in independent nonprofit organizations during 1965–70 (appendix table B–15 and chart 7). Engineers replaced physical scientists as the second largest group in 1967, and they maintained this position in 1970. The large declines in the numbers of mathematicians and psychologists during 1967–70 were due to the shifts previously mentioned.[6] Despite the shifts, social scientists registered a 4.9-percent annual increase during 1967–70.

Chart 7.

Employment of scientists and engineers in research institutes, by field of employment, January 1965, 1967, and 1970



Source: National Science Foundation (appendix table B-15).

The decline in the number of master's and bachelor's degree-holders during 1967–70 must also be laid to the shift of institutions (appendix table B–15). The doctorate group was the only one to show an employment increase, despite the fact that it was also greatly affected by the institutional shift (chart 8 and appendix table B–5).[7]

Technicians

The 4,800 technicians employed by research institutes in 1970 comprised 20 percent of their

[5] Nearly three-fifths of which were scientists, engineers, and technicians working on R&D projects.

[6] The four former research institutes employed 1,170 mathematicians and 500 psychologists in January 1967.

[7] The four large institutions which transferred from the research institutes category during 1967–70 accounted for 355 Ph. D's, 6 M.D.'s, 375 master's, and 1,646 bachelor's degrees.

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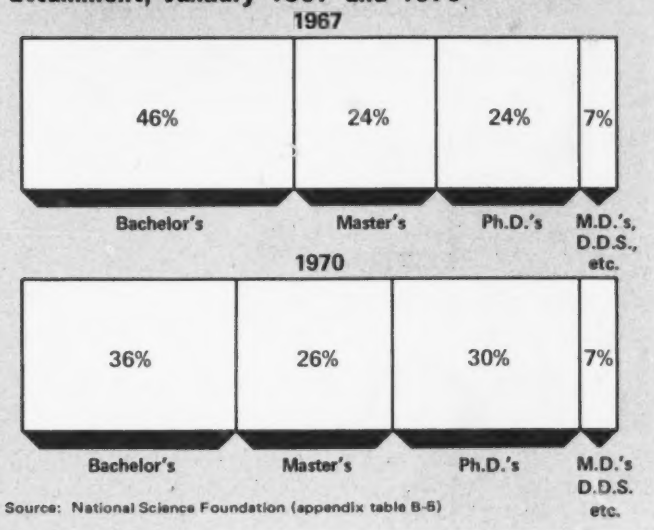
Chart 8.

Percent distribution of scientists and engineers in research institutes, by level of educational attainment, January 1967 and 1970



Source: National Science Foundation (appendix table B-6)

total employment (appendix table B–1). As would be expected, nearly all, 96 percent, assisted in the performance of research and development. Institutions in the $5 million or more R&D expenditure-size category accounted for 54 percent of R&D technicians, while those organizations with R&D performance between $1 million and $5 million employed 29 percent. There was an almost equal distribution between the engineering and physical sciences and the life sciences. The former disciplines accounted for 45 percent of the R&D technicians and the latter for 47 percent (appendix table B–8).

Total Expenditures

Total research institutes expenditures amounted to $425 million in 1969; all but $64 million of which was devoted to intramural research and development. Of the $64 million, almost one-half, $29 million, was spent for capital R&D projects.[8] The remainder covered "all other expenditures," including expenses for current operations and administration as well as for gifts, grants, contracts, scholarships, etc., made to outside organizations and individuals. (See research institutes questionnaire in appendix C.)

[8] Nearly one-third of capital R&D expenditures were financed by the Battelle Memorial Institute.

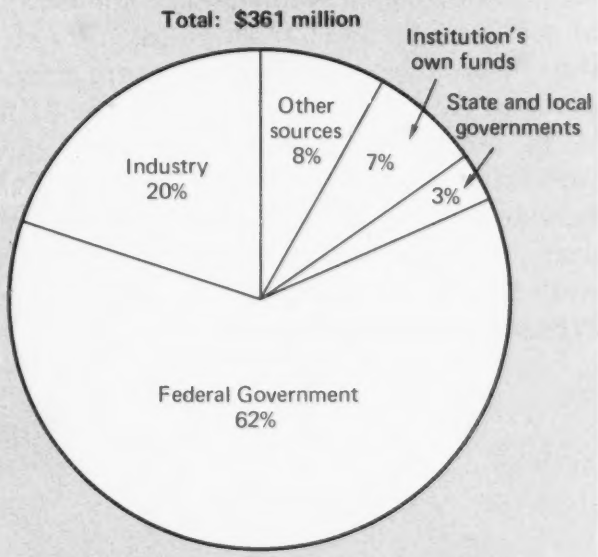
Intramural R&D Performance

The growth rate of R&D performance has slowed considerably in recent years (appendix table B–16). For example, between 1964 and 1966, current expenditures for intramural research and development rose at a compound annual rate of 8.6 percent, but declined to a 3.7-percent rate of growth during 1966–69. Again, the shift from the research institutes category was the significant factor in the decline. The exclusion from the 1966 data of the organizations involved in the shift shows intramural R&D expenditures rose at an annual rate of 6.8 percent during 1966–69. The decrease in the growth rate was thus not as dramatic as it initially appeared to be.

A lessening in the annual growth rate of Federal funding between the two time frames—from 7.6 percent (1964–66) to 1.8 percent (1966–69)—was primarily responsible for the slowdown in R&D performance (appendix table B–16). It should be emphasized, however, that Federal financing is by far the most important source of support for R&D performance. The Federal outlay of $224 million in 1969 accounted for more than three-fifths of all funds earmarked for intramural research and development (chart 9).

Support from industry was second only to the Federal financing in importance. The annual

Chart 9. Current expenditures for R&D performance of research institutes, by source of funds, 1969



Source: National Science Foundation (appendix table B-11).

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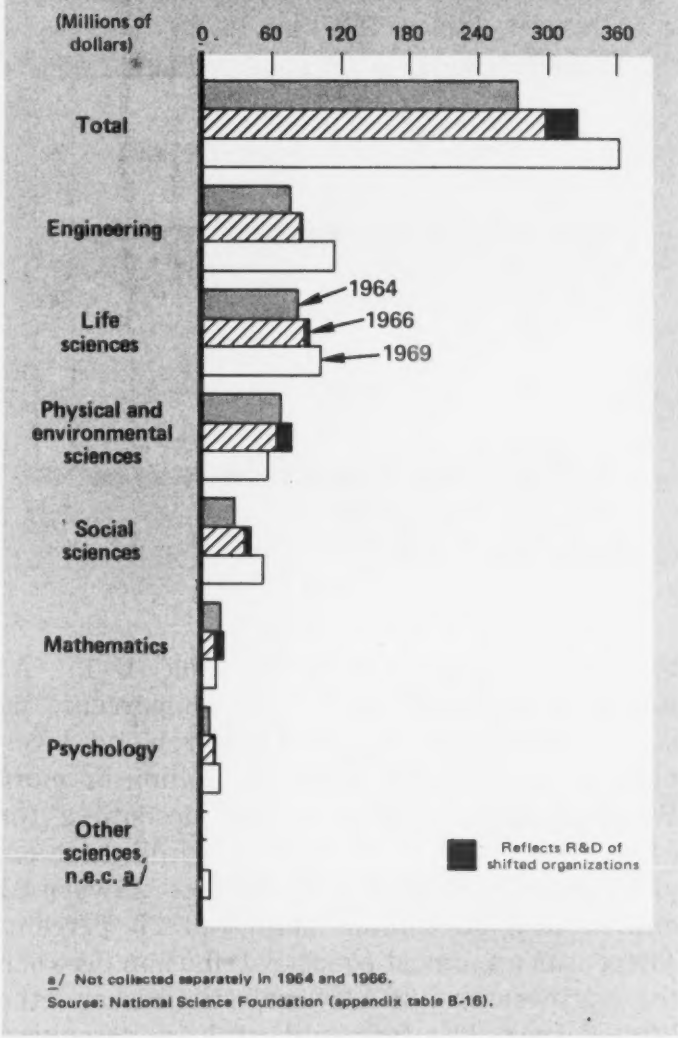
growth of industry funding for intramural R&D performance was 9.5 percent per year during 1966–69. In 1969, the industry outlay of $74 million accounted for more than one-fifth of intramural R&D funding. State and local government support for R&D performance rose considerably over both time periods. The growth of support from all other sources during 1966–69 was sharply reduced from the 1964–66 levels and, in the case of institutions' own funds, declined.

Two scientific disciplines—engineering and the life sciences—together accounted for $215 million, or almost three-fifths of the intramural R&D expenditures of research institutes in 1969 (appendix table B–16 and chart 10). The emphasis on these two fields was primarily due to the large federally sponsored R&D projects supporting defense and atomic energy programs. Psychology, engineering, and social sciences were the fields that experienced the highest annual rates of growth—9 to 10 percent—during 1966–69. R&D expenditures in the physical and environmental sciences and mathematics declined during 1966–69, but this was largely due to the organizational shifts already mentioned. The exclusion from the 1966 data of the organizations involved in the shift reveals R&D expenditures in mathematics actually increased 12.5 percent per year during 1966–69, and the decline in physical and environmental sciences was 4.9 percent.

As would be expected, the largest institutions (those with $5 million or more in intramural R&D expenditures) accounted for the major portion of such expenditures in almost all fields of science (appendix table B–13). Life sciences, the one notable exception, were supported to the greatest extent by institutions in the $1 million to $5 million R&D expenditure-size category. Institutions with $5 million or more in R&D performance were most heavily engaged in engineering research and development. Life sciences were the predominant field in every other R&D expenditure-size category.

Chart 10. Current expenditures for R&D performance of research institutes, by field of science, 1964, 1966, and 1969



a/ Not collected separately in 1964 and 1966.
Source: National Science Foundation (appendix table B-16).

Concentration in R&D performance among the largest research institutes has remained relatively stable during 1964–69 (appendix table B–17). Except in the first four organizations, there was a small dip in the R&D performance effort in the period 1964–66, and a slight rise during 1966–69. The distribution of Federal R&D funds showed a similar trend for the first 8, 12, and 16 organizations.

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SECTION 3. Federally Funded Research and Development Centers Administered by Nonprofit Organizations

FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC's) are R&D organizations that were established to meet the particular research needs of Federal agencies. Such centers are operated for the Federal Government by universities and university-consortia, independent nonprofit organizations, and industrial firms. This section is limited to summary data on financial and manpower characteristics of the 27 FFRDC's administered by nonprofit institutions in 1970.[9]

Prior to 1967 the decision as to whether a given center was to be classified as an FFRDC was made by the sponsoring Federal agency within a rather broad definitional framework. In 1967, the Federal Council for Science and Technology (FCST) established uniform criteria to be used by all Federal agencies, and on the basis of these criteria the FCST issued a Government-wide Master List of FFRDC's. As defined by the FCST, an FFRDC is an organizational unit that possesses the following principal characteristics:[10]

(1) Its primary activities include basic research, applied research, development, or R&D management;
(2) Organized as a separate operational unit and expected to have a long-term relationship (about 5 years or more) with its sponsoring agency, as evidenced by specific obligations assumed by it and the agency;
(3) Conducts R&D work upon direct request of, or under a broad charter from, the sponsoring Federal agency;
(4) Receives at least 70 percent of its financial support from the Federal Government;
(5) Has an average annual budget of at least $500,000; and
(6) Most or all of its facilities are owned or are funded for in the contract with the Federal Government.

FFRDC's administered by nonprofit institutions emerged as an institutional form after World War II. The first nonprofit-administered FFRDC was the Air Force-sponsored RAND Corp., formed in 1948 to do analytical research on questions related to the Nation's security and general welfare. At present, the Department of Defense (DOD) accounts for only 8 of the 27 nonprofit-administered FFRDC's in existence, but for almost two-thirds of the total R&D expenditures of these organizations. Aerospace Corp., which is Air Force sponsored, is the largest FFRDC. Its R&D performance alone comprised more than one-fourth the total for nonprofit-administered FFRDC's in 1969. Aerospace's major orientation is toward the advancement of space and ballistic missile technology for the United States.

The Atomic Energy Commission (AEC) principally sponsors two nonprofit-administered FFRDC's: the Pacific Northwest Laboratories and the Atomic Bomb Casualty Commission. Pacific Northwest Laboratories, administered by the Battelle Memorial Institute, is second only to Aerospace Corp. in terms of expenditures for research and development. It accounted for 23 percent of current and 76 percent of capital R&D outlays of nonprofit-administered FFRDC's in 1969. The major R&D projects conducted by the

[9] See appendix D for a list of nonprofit-administered FFRDC's covered in this survey.

[10] For a more detailed description of the criteria used to define FFRDC's, see National Science Foundation, *Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1969, 1970, and 1971*, Vol. XIX (NSF 70–38) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1970), p. 92.

Laboratory are related to AEC's Reactor Program. The Atomic Bomb Casualty Commission, administered by the National Academy of Sciences, is charged with the responsibility of investigating the delayed effects of radiation in the exposed and control groups selected from the populations of Hiroshima and Nagasaki, Japan.

Fifteen regional educational laboratories were established under Title IV of the Elementary and Secondary Education Act of 1965. Since that time seven laboratories have been added and five have ceased operations. The 17 laboratories presently in existence operate under contract with the U.S. Office of Education and together form a national network of R&D institutions. Their primary purpose is to bring research and development to bear upon educational practice and thus improve education for the children of the Nation. The laboratories seek to accomplish this by developing curriculums, identifying new methods of teaching, by assessing available educational talents and resources, and by implementing worthwhile innovations.

The Educational Development Center (EDC) and the Southwest Educational Development Laboratory (SEDL), are the two largest R&D educational laboratories.[11] As a regional educational laboratory, EDC is engaged in the cooperative planning of educational development programs in several communities. Pilot programs are being conducted in the urban centers of Washington, D.C., Boston, Mass., and Bridgeport, Conn., as well as in a rural area of midcoast Maine. SEDL concentrates its efforts on the educational achievement of the Mexican-American, the Negro-American, and the French Acadian.

In 1970, when this survey was conducted, there were 27 nonprofit-administered FFRDC's. The number of centers has tended to increase during the years after World War II and changes in classification of centers have occurred from time to time. The Pacific Northwest Laboratories, prior to 1966, were operated by the General Electric Co. and had been classified in the industry sector of the economy. The Center for Naval Analyses became a university-administered FFRDC in 1967, while the Human Resources Research Organization (HumRRO) severed its ties with George Washington University and became a nonprofit-administered FFRDC in 1969. Finally, EDC, previously classified as a research institute, is now considered a nonprofit-administered FFRDC by the U.S. Office of Education. In the interpretation of trend data shown in this section, one of the limitations that should be taken into account is this fluctuation in the number and types of nonprofit-administered FFRDC's that has occurred through the years.

Total Employment

Employment in all activities in the 27 FFRDC's administered by nonprofit institutions totaled 13,900 in January 1970, up slightly from the 13,200 reported in 1967 (appendix table B–1). However, this rise is largely attributable to the addition of HumRRO, EDC, and the large personnel increases at Pacific Northwest Laboratories (PNL) and SEDL. The transferring of the Center for Naval Analyses to the university sector, the closing down of Rocky Mountain Regional Educational Laboratory and the large personnel cuts at Aerospace and Research Analysis Corp. offset what would otherwise have been a much larger increase. During the 3-year period, employment in DOD-sponsored centers declined. However, the rise in employment in AEC- and HEW-sponsored FFRDC's more than compensated for this decrease.

Scientists and Engineers[12]

The growth rate in the number of scientists and engineers employed slowed dramatically during the 1967–70 time frame (appendix table B–18). From an annual rate of increase of 17.1 percent between 1965–67, growth slackened to 3.3 percent during 1967–70. This reduced rate of growth was attributable to reductions made by DOD-sponsored nonprofit-administered FFRDC's which amounted to nearly 400 scientists and engineers in the 3-year period. Conversely, such employment rose by more than 400 scientists and engineers in AEC-sponsored centers and by more than 500 in OE regional laboratories.

The concentration of scientists and engineers among the largest nonprofit-administered FFRDC's has decreased substantially from the levels recorded in 1965 (appendix table B–19).

[11] Besides operating a regional educational laboratory in New England, EDC conducts a wide range of R&D projects both in the United States and overseas.

[12] All scientists and engineers at nonprofit-administered FFRDC's are considered to be primarily engaged in R&D performance.

For example, the four largest institutions which had employed 83 percent of the scientists and engineers in 1965, accounted for only 72 percent of these persons in 1970. Similarly, the employment of scientists and engineers among the largest 8, 12, 16, and 20 organizations showed definite reductions in the concentration level over the past few years.

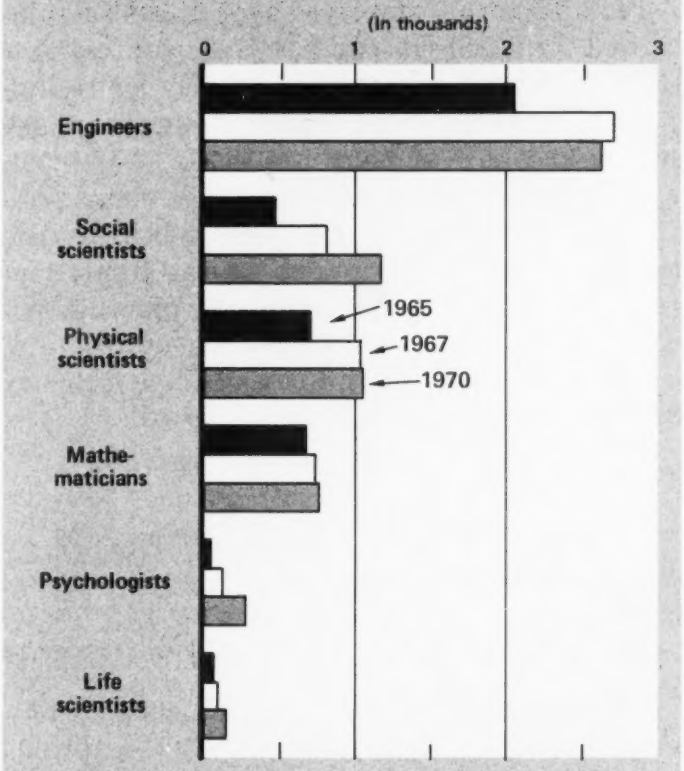
Despite the decline in the employment of scientists and engineers at DOD-sponsored nonprofit-administered FFRDC's, these institutions still account for the major portion of such personnel. In 1970, this amounted to 66 percent of the 6,100 scientists and engineers employed. AEC-sponsored nonprofit-administered FFRDC's ranked second with 19 percent and those sponsored by HEW ranked third with 15 percent.

Engineering employment predominates in nonprofit-administered FFRDC's (appendix table B–18 and chart 11). It approximated 50 percent of total professional employment in both 1965 and 1967. During 1967–70, however, engineering employment declined 1 percent per year, and its share of total professional scientific and engineering personnel shrank to 43 percent. The decline in engineers, as might be expected, was most severe in nonprofit-administered FFRDC's sponsored by DOD, and was especially pronounced in the Aerospace Corp. Physical scientists were the second most predominant group in 1965 and 1967. However, the low rate of growth in physical scientists, less than 1 percent per year during 1967–70, has allowed social scientists to replace them in numerical importance. The rise in the number of social scientists and psychologists during the past few years was due primarily to their increased employment in OE regional laboratories. Institutions in the $5 million or more R&D expenditure-size category accounted for almost all of the engineers, physical scientists, and mathematicians, as well as a high percentage of the life and social scientists (appendix table B–4).

In 1970, engineers again predominated at nonprofit-administered FFRDC's sponsored by DOD and AEC. Nonprofit-administered FFRDC's sponsored by DOD also employed the most physical scientists and mathematicians; AEC, the most life scientists; and HEW, the most social scientists and psychologists (appendix table B–20).

Chart 11.

Employment of scientists and engineers in nonprofit-administered FFRDC's,[a/] by field of employment, January 1965, 1967, and 1970



a/ Federally Funded Research and Development Centers.
Source: National Science Foundation (appendix table B-18).

Although all degree categories recorded increases in the number of scientists and engineers during 1967–70, the increases were substantial only for the advanced-degree groups (appendix table B–18). Bachelor's degree-holders, as a percent of the total, actually declined during the period. Whether persons in this group were affected by the cutbacks at DOD-sponsored centers or whether they achieved advanced-degree status cannot be definitively answered. The reduction in force which occurred at Aerospace Corp. did affect holders of bachelor's degrees to the greatest extent. Total employment of scientists and engineers at this institution was reduced by 4.5 percent per year during 1967–70, while the annual percentage decline in the number of bachelor's degree-holders amounted to 7.8 percent during the same period. On the other hand, there were 100 fewer holders of bachelor's degrees at MITRE Corp. in 1970, as compared with 1967, partly because of the achievement of advanced degrees by MITRE's professionals and also because of an increased emphasis on hiring

higher-qualified individuals. Total employment of scientists and engineers at MITRE increased slightly during the 1967–70 time frame.

Technicians

Technicians are employed by nonprofit-administered FFRDC's to support their professional staff. As would be expected, nearly all technicians, 93 percent, were primarly engaged in research and development and most, 80 percent, were in the larger institutions; i.e., those with $5 million or more in R&D expenditures (appendix table B–1). Employment was highly concentrated in the engineering and physical sciences, with more than two-thirds of the total working in these disciplines. Employment by field for 1970 was as follows:

Field of employment	*January 1970*	
	Total	*Percent in R&D*
Number of technicians, total	1,500	93
Engineering and physical sciences	1,000	92
Life sciences	300	100
Social sciences	200	92

The ratio of technicians to scientists and engineers averaged 26 per 100 in 1970. Nonprofit-administered FFRDC's sponsored by DOD and AEC employed an almost equal number of technicians, but the ratio was much higher in AEC centers. Employment by sponsoring Federal agency for 1970 was as follows:

Sponsoring Federal agency	*January 1970*	
	Total	*Ratio per 100 scientists and engineers*
Number of technicians, total	1,500	26
DOD	700	18
AEC	700	60
HEW	100	13

Total Expenditures

Total nonprofit-administered FFRDC expenditures amounted to $295 million in 1969. Intramural research and development accounted for all but 6 percent of this sum. A little over $4 million was spent for capital R&D projects, while "all other expenditures" accounted for the remaining $13 million. (See nonprofit-administered FFRDC questionnaire in appendix C.)

Intramural R&D Performance

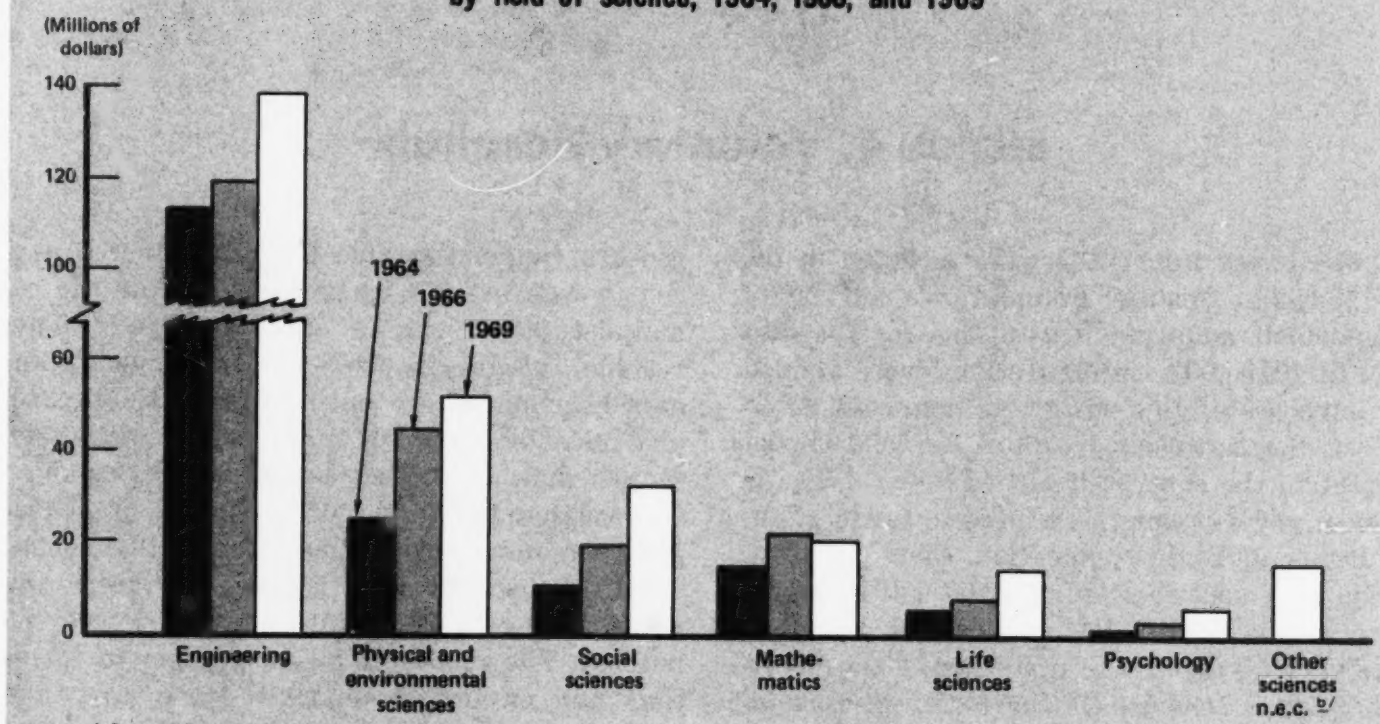
The growth rate of R&D performance has slowed down somewhat in recent years (appendix table B–21). For example, between 1964 and 1966 current expenditures for research and development rose at a compound annual rate of 12.6 percent, but declined to a 9-percent rate of growth during 1966–69. A lessening in the annual growth rate of Federal funding between the two time frames—from 12.2 percent to 7.6 percent—was primarily responsible for the slowdown. Support for R&D performance from State and local governments, industry and institutions' own funds showed some gains in recent years. However, the Federal share of nonprofit-administered FFRDC support accounted for 95 percent of intramural R&D performance in 1969.

With the exception of MITRE Corp., increases in the level of Federal support of DOD-sponsored centers were minimal. In fact, three centers—Aerospace Corp., Institute for Defense Analyses, and Research Analysis Corp.—experienced reductions in their levels of Federal financing. Despite the slackening of Federal funds to DOD-sponsored nonprofit-administered FFRDC's, the eight existing centers accounted for 65 percent of federally financed intramural R&D performance in 1969.[13] In contrast to the situation in DOD-sponsored centers, no AEC- or HEW-sponsored center incurred a reduction in Federal support. AEC-sponsored FFRDC's accounted for 23 percent of Federal support, and HEW centers for 12 percent of the total. Large increases were reported by several institutions, the most significant of which was the Pacific Northwest Laboratories' $27 million increase in Federal funding.

Although expenditures for engineering research and development predominated in nonprofit-administered FFRDC's, it was not the fastest growing scientific field (appendix table B–21 and chart 12). Expenditures for research and development in psychology and social sciences rose faster, but the base for both fields was significantly below that of engineering. The decrease in expenditures for mathematics research and development was directly attributable to the change in status of the Center for Naval Analyses, from a nonprofit-administered FFRDC to a university-administered center, and a tendency for some centers to classify mathematics-related research with research related to the physical sciences.

[13] Only $8.4 million of these centers' R&D performance was nonfederally financed.

Chart 12. Current expenditures for R&D performance of nonprofit-administered FFRDC's,[a] by field of science, 1964, 1966, and 1969



a/ Federally Funded Research and Development Centers.
b/ Not collected separately in 1964 and 1966.
Source: National Science Foundation (appendix table B-21).

DOD-sponsored nonprofit-administered FFRDC's accounted for the major portion of research and development in engineering, and the physical and mathematical sciences, and psychology (appendix table B–22). The R&D performance of AEC-sponsored organizations was predominant in the environmental and life sciences, and, was also significant in the physical sciences and engineering. As might be expected, the research efforts of organizations sponsored by HEW's Office of Education were concentrated in the social sciences.

Concentration of R&D performance among the largest nonprofit-administered FFRDC's was still quite pronounced in 1969, although a reversal in this trend has been evident since 1966 (appendix table B–23). For example, the four largest institutions which accounted for 87 percent of intramural research and development in 1964 performed only 74 percent in 1969. Similarly, the proportion of research and development performed by the top eight organizations in 1969 was lower than in 1964.

SECTION 4. Voluntary Hospitals

VOLUNTARY HOSPITALS were included in the National Science Foundation's survey of independent nonprofit institutions for the first time in 1970.[14] These institutions were defined for purposes of this survey as nonprofit members of the American Hospital Association not subject to the control of either Federal, State, or local governments, nor integral parts of institutions of higher education. The last-mentioned criterion was the most difficult to apply, since many nominally independent hospitals have varying degrees of affiliation with university medical schools. Of the 18 largest hospitals—those with current R&D expenditures in excess of $2 million—12 had arrangements with universities ranging from limited participation in the university's medical program, sometimes only for residencies, to functioning as a major unit of the school's teaching program.

A number of hospitals with substantial R&D programs have set up research organizations with varying degrees of affiliation with the parent organizations, through which their research programs are channeled. Conversely, a number of research institutes with programs in the medical area have set up hospitals which, while providing patient care, function primarily as laboratories for the research institutes. Where such functional relationships could be determined, hospitals operated by research institutes are included in the "Research Institutes" category (section 2 of this report). Data presented in this section of the report refer to 147 hospitals.

Total Employment

Of the 221,300 employees reported by voluntary hospitals in the 1970 survey, only 2 percent came within the definition of scientists and engineers (appendix table B–1). Another 8 percent were classified as technicians, and the remainder, 90 percent, as "other employees." This residual category is composed of physicians engaged primarily or entirely in patient care, pharmacists, administrators, nurses, dieticians, nurses' aides, and other supporting personnel.

More than four-fifths, or 81 percent, of all hospital personnel were employed on a full-time basis. In the case of scientists and engineers, the proportion employed full-time was lower, 75 percent. The relatively larger number of scientists and engineers employed on a part-time basis primarily represented physicians who were on the staffs of large medical centers for the purposes of participating in research projects, but who also maintained private practices. This tendency was more marked in the larger hospitals: the 11 which employed 100 or more scientists and engineers accounted for 46 percent of all scientists and engineers, 56 percent of whom were employed on a part-time basis.

Scientists and Engineers

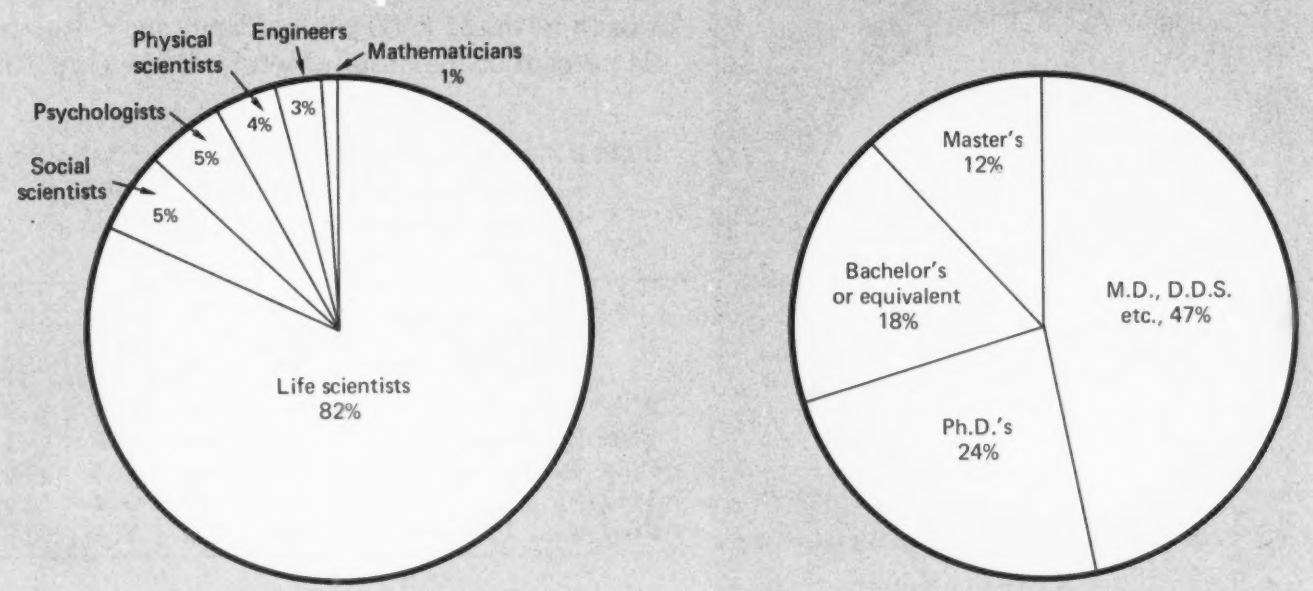
Ninety percent of the scientists and engineers employed in voluntary hospitals were primarily engaged in research and development (appendix table B–1). This high ratio was largely due to survey definitions which excluded medical practitioners if their primary function was the care and treatment of patients. The proportion engaged in research and development was virtually the same among those employed full and part time.

As expected, almost all of the 4,300 scientists and engineers employed by hospitals were working in the life sciences (chart 13). It was not unusual to find that psychologists and social scientists were also employed in hospitals, but the number of physical scientists, engineers, and mathematicians employed was surprising. Presumably, these persons were engaged in activ-

[14] For earlier years, data on R&D employment and expenditures were obtained from surveys conducted by the National Institutes of Health.

Chart 13. Distribution of scientists and engineers employed in voluntary hospitals, by field of employment and level of educational attainment, January 1970

TOTAL SCIENTISTS AND ENGINEERS: 4,300



Source: National Science Foundation (appendix tables B-4 and B-5).

ities with medical applications. Medical doctorates were most numerous, but were held by less than one-half of the scientists and engineers. Nonmedical doctorates accounted for nearly one-fourth the total, while master's and bachelor's degree-holders comprised the remaining 30 percent.

Technicians

In contrast with scientists and engineers, 83 percent of the technicians employed in voluntary hospitals were engaged in nonresearch activities. This difference is largely the result of the fact that all types of technicians were counted regardless of activity, whereas medical professionals primarily engaged in patient care and clinical practice were classified as "other employees." Almost all of the 3,000 technicians assisting in the performance of research and development were working in the life sciences.

Total Expenditures

Of the $2.3 billion spent by surveyed hospitals in 1969, only 6 percent was allocated to current intramural R&D expenditures, and less than 1 percent to capital R&D expenditures. (See voluntary hospital questionnaire in appendix C.) Only in a few specially designated research hospitals did the R&D expenditures comprise more than one-third of total outlays.

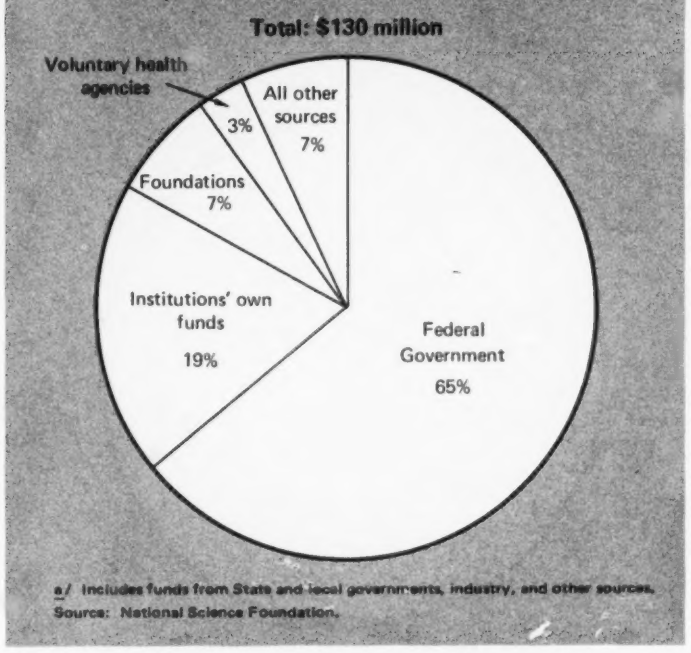
The $16 million in capital R&D expenditures was reported by 75 of the 147 hospitals surveyed. Only 24 hospitals reported capital R&D expenditures in excess of $100,000. Six hospitals, however, reported capital R&D expenditures of $500,000 or more; one of them indicated that a new research building was under construction.

Intramural R&D Performance

Of the $130 million allocated by voluntary hospitals to current R&D expenditures, nearly two-thirds was provided by the Federal Government (chart 14). In terms of R&D size-class, the distribution of current R&D expenditures of voluntary hospitals were concentrated in the $1 million to $5 million range (appendix table B–11). Only five hospitals reported current R&D expenditures in excess of $5 million, while 28 reported outlays ranging from $1 million to $5 million.

Chart 14.

Distribution of current expenditures for R&D performance in voluntary hospitals, by source of funds, 1969



a/ Includes funds from State and local governments, industry, and other sources.
Source: National Science Foundation.

As might be expected, the bulk of the R&D expenditures of voluntary hospitals, 95 percent, was in the life sciences. Hospitals alone accounted for 46 percent of the life sciences R&D performance in the nonprofit sector (appendix table B–13). The four largest voluntary hospitals in terms of R&D performance accounted for 24 percent of the hospital total in 1969 (table 3).

TABLE 3.—*Distribution of R&D activities among selected groups of voluntary hospitals with the largest R&D programs*

[Percent of total]

Voluntary hospitals ranked according to current expenditures for R&D performance	Current R&D expenditures, 1969		Scientists and engineers, January 1970	
	Total	Federal	Total	R&D
First 4	23.9	24.3	23.9	25.9
First 8	37.8	38.4	36.9	40.1
First 12	47.2	50.0	45.9	49.5
First 16	54.5	58.6	51.4	55.4
First 20	60.9	66.1	57.2	60.7

SECTION 5. Other Nonprofit Organizations

IN ADDITION to the three major types of institutions discussed in the foregoing sections, a number of less important types, in terms of the dollar volume of R&D performance, were surveyed. These included 36 professional and technical societies and academies of science, 19 private foundations, 15 science exhibitors, and 23 other nonprofit organizations, not elsewhere classified.

Total Employment

The 93 institutions which comprise this extremely diversified category reported a total of 20,100 employees in 1970, of whom scientists and engineers made up nearly 16 percent and technicians another 4 percent (appendix table B–1). The large remainder, "other personnel," was concentrated primarily in the residual category, other nonprofit organizations, n.e.c., which included such large voluntary health organizations as the American Cancer Society and the American National Red Cross, as well as the Menninger Foundation which possesses to some extent the characteristics of a research institute, a private foundation, and a hospital. These three organizations alone accounted for 43 percent of the total "other personnel," compared with only 4 percent of the scientists and engineers. As was the case with hospitals, a large proportion of these "other personnel" were physicians, nurses, dieticians, and therapists primarily engaged in patient care.

Scientists and Engineers

The 3,200 scientists and engineers employed in "other nonprofit organizations" represented a compound annual increase of 0.5 percent over the 3,100 reported in 1967. Though far less than the 12.8-percent increase between 1965 and 1967, it is significant that the employment of scientists and engineers at these institutions did increase throughout the period covered by the survey series, rather than decreasing since 1967, as was the case with research institutes. It should be noted, however, that this category of institutions did not undergo the large shifts, in terms of R&D performance, that characterized research institutes during 1967–70 (appendix table B-24).

Life scientists were the largest single group of scientists or engineers employed in "other nonprofit organizations" in 1970, accounting for 35 percent of the total. An additional 25 percent were employed in the social sciences, and 18 percent in the physical sciences. The three institutions leading in life science employment were the Rockefeller Foundation, the American National Red Cross and the Field Museum of Natural History. Together, these three organizations employed 24 percent of the life scientists reported by all "other nonprofit organizations." Similarly, three organizations, the Educational Testing Service, the National Industrial Conference Board, and the American College Testing Program, accounted for 30 percent of all social scientists reported by "other nonprofit organizations." The American Chemical Society employed 70 percent of all physical scientists; the National Academy of Sciences, 57 percent of all engineers; and the Educational Testing Service, 61 percent of the mathematicians as well as 53 percent of the psychologists.

Holders of the Ph. D. degree were the most numerous group in "other nonprofit organizations" in 1970 with 36 percent of the total. Those with only bachelor's degrees comprised the second-largest group, with 29 percent. Most of the Ph. D.'s and M.D.'s were working in the life sciences, while the largest number of master's degree-holders were employed in the social sciences. The reason for the preponderance of bachelor's degree-holders in the physical sciences was the influence of the American Chemical So-

ciety, nine-tenths of whose scientists and engineers were physical scientists, one-half of whom held only bachelor's degrees.

Organizations in this category reported that 60 percent of their scientific and engineering professional personnel were primarily engaged in research and development—far below the level in other institutional types. This is to be expected, however, as research for several of the organizations in this category is a relatively minor portion of their activities.

Technicians

Of the 800 technicians employed in "other nonprofit organizations," 76 percent were primarly engaged in research and development and most of these, 59 percent, were in the life sciences. The ratio of R&D technicians to R&D scientists and engineers was 32 to 100. Although this ratio was smaller than that for all institutions in the nonprofit sector, 45 to 100, it was still higher than the 24 to 100 ratio reported by nonprofit-administered FFRDC's.

Total Expenditures

"Other nonprofit organizations" reported expenditures of $425 million in 1969, of which current R&D performance made up 18 percent and capital R&D expenditures slightly under 1 percent. The relatively low percentage of total expenditures allocated to R&D performance and capital R&D expenditures can be explained by the fact that the voluntary health agencies and private foundations within this category typically allocate large amounts of their funds for extramural purposes, including R&D financing.

Intramural R&D Performance

The $77 million allocated to current intramural R&D projects by "other nonprofit organizations" represented an annual rate of increase of 10.5 percent during the 1966–69 period as compared with an annual growth rate of 15 percent between 1964–66 (appendix table B–25). The slowdown resulted primarily from decreased growth in Federal support, from 17.6 percent between 1964–66 to 12.8 percent during 1966–69. However, Federal funding, at 46 percent of the total, remained higher than that received from any other source. The National Academy of Sciences, with one-third of the R&D expenditures of all "other nonprofit organizations," had a great influence on the growth rates and Federal funding of this category.

The life sciences accounted for the largest single portion of current R&D expenditures, 36 percent of the total. Eight organizations reported life science expenditures of $1 million or more, which amounted to 62 percent of the life science R&D expenditures of all "other nonprofit organizations." This group included two academies of science, three private foundations, a museum, an arboretum, and one voluntary health agency.

Organizational Types

Of the four organizational types included within this category, the largest in terms of number of institutions, personnel, and expenditures was societies and academies of science (table 4). Professional and technical societies are voluntary associations of individuals sharing a common interest in the advancement of knowledge within a specialized scientific field; academies of science differ from them in that they cover many disciplines. The major function of both, however, is to aid and encourage the collection, collation, and dissemination of scientific knowledge for the benefit of their members and the scientific community as a whole. Nevertheless, four of these institutions reported intramural R&D expenditures of more than $1 million: the National Academy of Sciences, the American Chemical Society, the Academy of Natural Sciences of Philadelphia, and the American Dental Association. These four institutions accounted for 62 percent of the scientists and engineers employed by the 36 societies and academies of science; 51 percent of all those primarily engaged in research and development; 79 percent of all intramural R&D expenditures; and 88 percent of federally financed research and development performed by societies and academies of science.

Private foundations are nongovernmental, nonprofit organizations having principal funds of their own, managed by their own trustees or directors, and established to serve the common welfare. This organizational type includes operating foundations, which allocate the greater proportion of their R&D budgets to intramural performance, and philanthropic foundations, which allocate most of their funds to grants and contracts for research to be per-

TABLE 4.—*Selected employment and financial characteristic of "other nonprofit organizations." by type of organization, 1969 and January 1970*

Item	Total	Societies and academies	Private foundations	Science exhibitors	Other nonprofit organizations, n.e.c.
Number of surveyed organizations	93	36	19	15	23
	Scientific and engineering employment, January 1970				
Scientists and engineers	3,159	1,299	436	337	1,087
R&D	1,896	669	390	243	594
Other activities	1,263	630	46	94	493
Technicians	813	160	152	214	287
R&D	614	128	152	189	145
Other activities	199	32	------	25	142
	R&D financing, 1969 (thousands of dollars)				
Current R&D expenditures	$76,720	$37,643	$14,230	$8,094	$16,753
Federally financed, total	35,424	26,306	1,307	2,302	5,509
Institutions' own funds	26,355	5,367	11,674	3,438	5,876
Other sources	14,941	5,970	1,249	2,354	5,368
Capital R&D expenditures	3,428	1,067	1,306	68	987

formed extramurally. Foundations employed only 14 percent of the scientists and engineers and accounted for only 19 percent of the R&D expenditures of all "other nonprofit organizations," but were responsible for 44 percent of the total expenditures of the category. Three foundations—two operating foundations and one philanthropic foundation—had intramural R&D expenditures of over $1 million: the Carnegie Institution of Washington, the Rockefeller Foundation, and the Charles F. Kettering Foundation. These three institutions accounted for 86 percent of total foundations' scientists and engineers; 60 percent of those scientists and engineers primarily engaged in research and development; 61 percent of total intramural R&D expenditures; and 44 percent of federally financed R&D performance of private foundations.

The primary goal of nonprofit science exhibitors is the expansion of science literacy within their respective communities by providing exhibits that display and interpret the latest scientific findings in the various fields. Included in this category are museums, zoological parks, botanical gardens, and arboretums. Science exhibitors are the smallest of the institutional types included within "other nonprofit organizations," in terms of both scientists and engineers employed, and R&D expenditures, accounting for only 11 percent of the total scientists and engineers and R&D expenditures of "other nonprofit organizations."[15] Four science exhibitors—the American Museum of Natural History, the Bernice Pauahi Bishop Museum, the New York Botanical Gardens, and the Field Museum of Natural History—reported current R&D expenditures of $1 million or more. These four institutions accounted for 62 percent of science exhibitors' scientists and engineers; 63 percent of the number primarily engaged in research and development; 75 percent of all current R&D expenditures; and 76 percent of the federally financed research and development performed by science exhibitors.

The other nonprofit organizations, not elsewhere classified (n.e.c.) group includes independent nonprofit institutions engaged in the performance of R&D activities that could not be readily classified into any of the institutional types covered in this and other sections of this report. The kinds of activities in which such institutions were principally engaged included the following: rehabilitation services; vocational, educational, and training programs; consumer

[15] The figures reported here for science exhibitors are not compatible with those in the final reports on previous surveys in the series. This is primarily because science exhibitors under local government control are now included in the government sector of the economy. In addition, three institutions formerly classified as science exhibitors are now included in other categories within the nonprofit sector.

services; and information dissemination. Institutions in this group ranked second only to societies and academies of science in the employment of scientists and engineers, 34 percent, and expenditures for R&D performance, 22 percent, by "other nonprofit organizations." Four institutions—Educational Testing Service, Population Council, National Industrial Conference Board, Inc., and the American National Red Cross—spent more than $1 million for intramural research and development. These four institutions accounted for 58 percent of other nonprofit, n.e.c.'s scientists and engineers; 58 percent of the R&D scientists and engineers; 63 percent of total R&D performance; and 58 percent of federally funded research and development performed by institutions within the other nonprofit, n.e.c. category.

Appendixes

A. Technical Notes

B. Statistical Tables

C. Reproduction of Covering Letter, Summary Questionnaires, and Instructions

D. List of Federally Funded Research and Development Centers Administered by Nonprofit Organizations

APPENDIX A

Technical Notes

Survey Coverage

The 1970 survey of independent nonprofit research organizations obtained data on the financial and manpower resources devoted to research and development in the sciences and engineering. Organizations covered by the survey included research institutes; Federally Funded Research and Development Centers (FFRDC's) administered by nonprofit organizations; voluntary hospitals; societies and academies of science; private foundations; science exhibitors; and other nonprofit organizations, n.e.c. with R&D programs that could not be classified into any of the above categories. The latter group included a small number of voluntary health agencies with intramural R&D programs. Educational institutions and any other organizations owned, operated, or controlled by Federal, State, or local governments were excluded from this report.

Survey questionnaires were mailed in April 1970 to 561 organizations known or believed to have allocated at least $100,000 to the performance of intramural R&D projects. These included 198 research institutes, 32 nonprofit-administered FFRDC's, 177 voluntary hospitals,[1] 55 societies and academies of science, 22 private foundations, 24 science exhibitors, 35 voluntary health agencies,[2] and 16 other nonprofit organizations, n.e.c. In May and June followup questionnaires were mailed to nonrespondent institutions, and during the month of July, all nonrespondent institutions believed to have allocated $500,000 or more of current funds to intramural R&D projects were contacted by telephone. During the course of the data-collection phase of the survey, 135 institutions that no longer conducted intramural R&D programs were deleted from the survey universe.

The survey universe thus comprised 426 organizations of which 346, or 81 percent, returned usable replies (appendix table A–1). Estimates for the 80 nonrespondent institutions were based, where possible, on information obtained from earlier surveys in the series, or other information provided by the institutions themselves, such as treasurer's reports, annual reports, brochures, etc. Where these sources were unavailable, estimates were based on grant lists published by various Federal agencies.

The basic mailing list for the 1970 survey was compiled using the master lists from similar surveys conducted in 1964 and 1966, and from lists of hospitals and health agencies obtained from the National Institutes of Health. In each case, organizations known to be controlled by State or local governments, as well as those reporting intramural R&D expenditures of less than $75,000 in 1966, were excluded. Additional organizations were gleaned from the following sources:

(1) Palmer, Archie, ed., *Research Centers Directory,* 3rd ed. (and supplements). Detroit, Mich.: Gale Research Co., 1968.

(2) National Science Foundation, "Master List of Federally Funded Research and Development Centers (FFRDC's) (as of August 1, 1969)" (unpublished).

(3) American Hospital Association, *Hospitals,* vol. 43, No. 15, Aug. 1, 1969.

[1] Voluntary hospitals with R&D programs were included in the survey universe for the first time; heretofore, data on these institutions had been obtained from surveys conducted by the National Institutes of Health.

[2] Since voluntary health agencies are primarily supporters rather than performers of research, data on intramural research and development were obtained from only five institutions. These have been included with other nonprofit organizations, n.e.c.

(4) Ruffner, Frederick G., Jr., ed. *Encyclopedia of Associations,* 4th ed. vol. I, *National Organizations of the United States* (and supplements), Detroit, Mich.: Gale Research Co., 1964.

(5) Lewis, Marianna O., ed., *The Foundation Directory,* Ed. 3. New York: Russell Sage Foundation, 1967.

(6) American Association of Museums and the Smithsonian Institution, *Museums Directory of the United States and Canada,* 2d ed. Washington, 1965.

(7) National Academy of Sciences, *Scientific and Technical Societies of the United States,* 8th ed., Pub. 1499. Washington, 1968.

(8) Lists of grants published by Federal agencies.

Addresses for institutions which have relocated since the last survey or which had not been surveyed previously were obtained from the Internal Revenue Service's *Cumulative List of Organizations,* Publication 78 (Rev. 12–68) (and supplements) and from the telephone directories of major cities.

Relationship to Earlier Surveys

The 1970 survey was broader in scope but smaller in coverage than the 1964[3] and 1966[4] surveys, as voluntary hospitals and health agencies were included for the first time, but only institutions known or believed to have expended $100,000 or more for intramural R&D performance were surveyed. Earlier NSF-sponsored surveys of selected groups of nonprofit institutions in 1953,[5] 1957,[6] and the 1960 survey of the scientific activities of private foundations[7] were also limited in coverage. The principal differences between the 1970 survey and the two immediately preceding ones were as follows:

(1) Previous surveys requested information relating to the full range of scientific and engineering activities of nonprofit organizations, such as intramural and extramural R&D financing, scientific and technical information activities, and education in the sciences. The present survey, however, concentrated primarily on intramural R&D expenditures and on the science and engineering personnel employed by such research organizations. Some items requested more detail than had been the case in previous surveys, for example, R&D expenditures by source of funds.

(2) Science exhibitors owned or operated by State and local governments or branches thereof, were no longer included in the "independent nonprofit" sector of the economy.

(3) For the first time, voluntary nonprofit hospitals and health agencies were included in the regular survey series. Data for these institutions were previously collected by the National Institutes of Health.

(4) Whereas previous surveys attempted to canvass all institutions known to have R&D programs, the present survey covered only those institutions that were known or believed to have expended $100,000 or more for intramural research and development. The data presented in the report include estimates for all surveyed nonrespondent organizations. However, estimates were not made for nonprofit organizations believed to have less than $100,000 in intramural R&D expenditures. On the basis of experience gained in previous NSF surveys, it is estimated that the R&D expenditures of the latter group of organizations comprised less than 1 percent of the total for surveyed institutions.

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[3] National Science Foundation, *Scientific Activities of Nonprofit Institutions—1964 Expenditures and January 1965 Manpower* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1967).

[4] National Science Foundation, *Scientific Activities of Nonprofit Institutions, 1966* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1969).

[5] The National Science Foundation issued four reports on these 1953 surveys: *Scientific Research Expenditures by the Large Private Foundations,* prepared for the National Science Foundation by F. Emerson Andrews; *Research by Cooperative Organizations: A Survey of Scientific Research by Trade Associations, Professional and Technical Societies, and Other Cooperative Groups, 1953,* prepared for the National Science Foundation by Battelle Memorial Institute; *Research and Development by Nonprofit Research Institutes and Commercial Laboratories,* 1953, prepared for the National Science Foundation by the Maxwell Research Center, Syracuse University (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1956); and *Research Expenditures of Foundations and Other Nonprofit Institutions, 1953–54* (Washington, D.C. 20550: National Science Foundation, 1957).

[6] National Science Foundation, *Scientific Research and Development of Nonprofit Organizations—Expenditures and Manpower, 1957* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1961).

[7] National Science Foundation, *Research and Other Activities of Private Foundations, 1960* (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1964).

Limitations of Data

As in previous surveys in the series, the most serious problems were those generated by the lack of a comprehensive mailing list, the dissimilarity among the types of institutions included within the sector, and the continual shifts of institutions, not only into and out of the sector, but among the categories within the sector, as well. An additional problem arose from the complex relationships which exist between institutions within and outside the sector. Various types and degrees of affiliation and cooperation, especially in cases where research institutes maintained close working relationships with universities or hospitals, made it difficult to determine whether a particular organization should be considered independent or not.

No single directory or source document lists every nonprofit organization which performs research and development. Therefore, the mailing list for the survey had to be compiled from previous surveys conducted by the National Science Foundation and the National Institutes of Health, as well as from a number of specialized directories (see Survey Coverage, *supra.*) It is possible that some new organizations, as well as a few older organizations which recently inaugurated R&D programs may have been overlooked. However, the number of such organizations with current R&D expenditures of $100,000 or more is believed to be extremely small.

Finally, variations in accounting procedures as well as different interpretations of concepts and definitions added to the limitations surrounding this survey of research and development. A number of institutions experienced difficulty in distinguishing between intramural and extramural research expenditures, between fields of science in certain multidisciplinary activities, and between "scientists and engineers" and "other personnel."

TABLE A–1.—*Response rate and proportions of selected manpower and financial characteristics imputed, by type of institution*

Item	All institutions	Research institutes	Nonprofit-administered FFRDC s [a]	Voluntary hospitals	Other nonprofit organizations
Number of institutions in survey	426	159	27	147	93
Number returning usable questionnaires	346	128	27	118	73
Response rate (percent)	81.2	80.5	100.0	80.3	78.5
Imputation rates (percent of published totals) [b]					
Total scientists and engineers, January 1970	11.6	6.6	2.2	23.9	29.0
R&D scientists and engineers, January 1970	8.3	5.0	2.2	20.8	19.1
Total R&D expenditures, 1969	5.0	2.5	----	16.9	14.2
Federally financed R&D expenditures, 1969	5.8	3.5	----	27.8	11.0

[a] Federally Funded Research and Development Centers. [b] Values were imputed to allow for nonresponse. For example, the imputed dollar volume of 1969 R&D expenditures amounted to $42 million, or 5 percent of the $845 million total for all surveyed nonprofit organizations, both respondents and nonrespondents.

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TABLE B–1.—*Total employment in independent nonprofit institutions, by occupational group, type of institution and R&D expenditure-size class, January 1970*

Occupational group	Total	R&D expenditure-size class (thousands of dollars)			
		Less than $500	$500–$999	$1,000–$4,999	$5,000 or more
	All institutions				
Total	279,598	122,647	37,890	72,543	46,518
Scientists and engineers	23,652	2,505	1,691	7,136	12,320
R&D scientists and engineers	21,556	1,903	1,466	6,011	12,176
Other scientists and engineers	2,096	602	225	1,125	144
Technicians	25,415	9,701	2,789	6,852	6,073
R&D technicians	9,807	1,159	763	3,340	4,545
Other technicians	15,608	8,542	2,026	3,512	1,528
Other employees	230,531	110,441	33,410	58,555	28,125
	Research institutes				
Total	24,315	2,355	1,575	7,317	13,068
Scientists and engineers	10,105	922	566	2,847	5,770
R&D scientists and engineers	9,692	775	535	2,696	5,686
Other scientists and engineers	413	147	31	151	84
Technicians	4,828	479	368	1,370	2,611
R&D technicians	4,617	425	352	1,349	2,491
Other technicians	211	54	16	21	120
Other employees	9,382	954	641	3,100	4,687
	Nonprofit-administered FFRDC's [a]				
Total	13,859	63	287	2,262	11,247
Scientists and engineers	6,057	43	123	827	5,064
R&D scientists and engineers	6,057	43	123	827	5,064
Other scientists and engineers	------	------	------	------	------
Technicians	1,546	5	45	260	1,236
R&D technicians	1,443	5	45	238	1,155
Other technicians	103	------	------	22	81
Other employees	6,256	15	119	1,175	4,947
	Voluntary hospitals				
Total	221,283	113,054	33,867	53,072	21,290
Scientists and engineers	4,331	712	580	1,828	1,211
R&D scientists and engineers	3,911	564	503	1,653	1,191
Other scientists and engineers	420	148	77	175	20
Technicians	18,228	8,919	2,285	4,804	2,220
R&D technicians	3,133	541	294	1,404	894
Other technicians	15,095	8,378	1,991	3,400	1,326
Other employees	198,724	103,423	31,002	46,440	17,859
	Other nonprofit organizations [b]				
Total	20,141	7,175	2,161	9,892	913
Scientists and engineers	3,159	828	422	1,634	275
R&D scientists and engineers	1,896	521	305	835	235
Other scientists and engineers	1,263	307	117	799	40
Technicians	813	298	91	418	6
R&D technicians	614	188	72	349	5
Other technicians	199	110	19	69	1
Other employees	16,169	6,049	1,648	7,840	632

[a] Federally Funded Research and Development Centers.

[b] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit organizations, n.e.c.

TABLE B–2.—*Total number of scientists and engineers employed in independent nonprofit institutions, by field of employment, January 1965, 1967, and 1970*

Field of employment	1965		1967		1970	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
Total	21,382	100.0	25,575	100.0	23,652	100.0
Engineers	4,329	20.2	5,478	21.4	5,208	22.0
Physical scientists	3,457	16.2	4,127	16.1	3,669	15.5
Mathematicians	2,387	11.2	2,510	9.8	1,499	6.3
Life scientists	7,628	35.7	8,481	33.2	8,008	33.9
Psychologists	1,333	6.2	1,883	7.4	1,412	6.0
Social scientists	2,248	10.5	3,096	12.1	3,856	16.3

TABLE B–3.—*Distribution of employment of scientists and engineers among selected groups of independent nonprofit institutions with the largest R&D programs, January 1965, 1967, and 1970*

[Percent of total]

Independent nonprofit institutions ranked according to current expenditures for R&D performance	Total scientists and engineers			R&D scientists and engineers		
	1965	1967	1970	1965	1967	1970
First 4	21.3	21.3	21.9	24.6	24.6	24.0
First 8	35.0	30.6	32.7	33.3	35.1	35.6
First 12	39.7	34.6	39.2	39.3	39.5	42.6
First 16	45.0	39.4	43.2	45.5	45.1	47.0
First 20	48.5	48.5	46.7	49.6	48.5	50.6

TABLE B–4.—*Total number of scientists and engineers employed in independent nonprofit institutions, by type of institution, field of employment, and R&D expenditure-size class, January 1970*

Field of employment	Total	R&D expenditure-size class (thousands of dollars)			
		Less than $500	$500 to $999	$1,000 to $4,999	$5,000 or more
	All institutions				
Total	23,652	2,505	1,691	7,136	12,320
Engineers	5,208	140	40	287	4,741
Physical scientists	3,669	159	114	894	2,502
Mathematicians	1,499	35	76	359	1,029
Life scientists	8,008	1,383	865	3,693	2,067
Psychologists	1,412	171	190	606	445
Social scientists	3,856	617	406	1,297	1,536
	Research institutes				
Total	10,105	922	566	2,847	5,770
Engineers	2,294	70	21	170	2,033
Physical scientists	1,874	104	90	359	1,321
Mathematicians	535	13	15	208	299
Life scientists	3,179	415	309	1,493	962
Psychologists	555	55	54	99	347
Social scientists	1,668	265	77	518	808
	Nonprofit-administered FFRDC's [a]				
Total	6,057	43	123	827	5,064
Engineers	2,629	--------	--------	33	2,596
Physical scientists	1,053	--------	1	25	1,027
Mathematicians	759	--------	6	36	717
Life scientists	153	--------	3	68	82
Psychologists	281	--------	17	207	57
Social scientists	1,182	43	96	458	585
	Voluntary hospitals				
Total	4,331	712	580	1,828	1,211
Engineers	116	33	10	58	15
Physical scientists	176	33	23	35	85
Mathematicians	39	11	17	6	5
Life scientists	3,556	551	445	1,583	977
Psychologists	224	42	54	95	33
Social scientists	220	42	31	51	96
	Other nonprofit organizations [b]				
Total	3,159	828	422	1,634	275
Engineers	169	37	9	26	97
Physical scientists	566	22	--------	475	69
Mathematicians	166	11	38	109	8
Life scientists	1,120	417	108	549	46
Psychologists	352	74	65	205	8
Social scientists	786	267	202	270	47

[a] Federally Funded Research and Development Centers.

[b] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit, n.e.c.

TABLE B–5.—*Total number of scientists and engineers employed in independent nonprofit institutions, by type of institution, level of educational attainment, and R&D expenditure-size class, January 1970*

Level of educational attainment	Total	R&D expenditure-size class (thousands of dollars)			
		Less than $500	$500 to $999	$1,000 to $4,999	$5,000 or more
	All institutions				
Total	23,652	2,505	1,691	7,136	12,320
Ph. D. or Sc.D.	6,601	841	570	2,607	2,583
M.D., D.D.S., etc.	3,098	552	358	1,349	839
Master's	6,115	547	368	1,252	3,948
Bachelor's or the equivalent	7,838	565	395	1,928	4,950
	Research institutes				
Total	10,105	922	566	2,847	5,770
Ph. D. or Sc.D.	3,080	341	250	1,200	1,289
M.D., D.D.S., etc.	723	111	96	374	142
Master's	2,636	211	109	445	1,871
Bachelor's or the equivalent	3,666	259	111	828	2,468
	Nonprofit-administered FFRDC's [a]				
Total	6,057	43	123	827	5,064
Ph. D. or Sc.D.	1,341	16	38	282	1,005
M.D., D.D.S., etc.	54	--------	1	51	2
Master's	2,195	19	49	252	1,875
Bachelor's or the equivalent	2,467	8	35	242	2,182
	Voluntary hospitals				
Total	4,331	712	580	1,828	1,211
Ph. D. or Sc.D.	1,036	216	127	464	229
M.D., D.D.S., etc.	2,015	304	183	845	683
Master's	503	90	96	186	131
Bachelor's or the equivalent	777	102	174	333	168
	Other nonprofit organizations [b]				
Total	3,159	828	422	1,634	275
Ph. D. or Sc.D.	1,144	268	155	661	60
M.D., D.D.S., etc.	306	137	78	79	12
Master's	781	227	114	369	71
Bachelor's or the equivalent	928	196	75	525	132

[a] Federally Funded Research and Development Centers.

[b] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit, n.e.c.

TABLE B–6.—*Geographic distribution of selected manpower characteristics of independent nonprofit institutions, January 1970*

Geographic location	Number of institutions	Total employment	Scientists and engineers		Technicians	
			Total	R&D	Total	R&D
United States, total	426	279,598	23,652	21,556	25,415	9,807
New England	52	44,749	3,306	3,250	3,688	1,500
Maine	2	1,958	101	101	127	38
New Hampshire	.....	.....	.....	.....	.....	.....
Vermont	1	331	6	6	26	3
Massachusetts	41	32,553	3,023	2,985	2,861	1,350
Rhode Island	1	3,299	58	49	264	51
Connecticut	7	6,608	118	109	410	58
Middle Atlantic	130	86,157	5,761	4,951	7,292	1,817
New York	80	53,269	3,727	3,418	4,383	1,293
New Jersey	10	6,504	600	333	369	70
Pennsylvania	40	26,384	1,434	1,200	2,540	454
East North Central	62	62,928	3,044	2,820	5,654	1,591
Ohio	20	24,392	1,458	1,432	2,664	688
Indiana	2	3,026	22	17	272	39
Illinois	26	26,143	1,318	1,131	1,945	784
Michigan	12	9,308	222	216	760	68
Wisconsin	2	59	24	24	13	12
West North Central	29	17,822	959	820	1,500	360
Minnesota	11	7,355	364	331	749	209
Iowa	2	265	86	19	3	1
Missouri	13	7,627	463	424	590	134
North Dakota	.....	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....	.....	.....
Kansas	3	2,575	46	46	158	16
South Atlantic	61	19,454	2,850	2,231	1,260	882
Delaware	1	20	7	7	7	7
Maryland	11	3,554	395	342	373	168
District of Columbia	33	11,716	1,493	942	497	426
Virginia	5	1,431	586	586	182	182
West Virginia	1	63	31	31	4	4
North Carolina	5	598	266	261	61	61
South Carolina	.....	.....	.....	.....	.....	.....
Georgia	1	34	19	19	2	2
Florida	4	2,038	53	43	134	32
East South Central	6	4,129	408	380	420	147
Kentucky	3	191	101	95	39	15
Tennessee	2	3,467	90	72	235	7
Alabama	1	471	217	213	146	125
Mississippi	.....	.....	.....	.....	.....	.....
West South Central	16	5,140	834	748	1,136	971
Arkansas	.....	.....	.....	.....	.....	.....
Louisiana	3	2,194	113	106	186	37
Oklahoma	2	386	69	69	205	205
Texas	11	2,560	652	573	745	729
Mountain	16	6,678	298	273	752	230
Montana	.....	.....	.....	.....	.....	.....
Idaho	.....	.....	.....	.....	.....	.....
Wyoming	.....	.....	.....	.....	.....	.....
Colorado	8	3,497	136	129	431	111
New Mexico	2	360	111	93	98	95
Arizona	5	1,840	50	50	145	23
Utah	1	981	1	1	78	1
Nevada	.....	.....	.....	.....	.....	.....
Pacific	54	32,541	6,192	6,083	3,713	2,309
Washington	8	6,422	1,280	1,249	892	568
Oregon	6	2,954	188	182	236	57
California	36	22,406	4,662	4,598	2,522	1,665
Alaska	.....	.....	.....	.....	.....	.....
Hawaii	4	759	62	54	63	19

TABLE B–7.—*Total and Federal R&D expenditures, 1969, and employment of scientists and engineers, January 1970, in independent nonprofit institutions in selected States ranked in terms of R&D expenditures*

[Dollars in thousands]

State	R&D expenditures, 1969				Scientists and engineers employed, Jan. 1970			
	Total		Federally financed		Total		Primarily in R&D	
	Amount	Percent distribution	Amount	Percent distribution	Number	Percent distribution	Number	Percent distribution
United States, total	$845,299	100.0	$606,595	100.0	23,652	100.0	21,556	100.0
California	192,508	22.8	158,762	26.2	4,662	19.7	4,598	21.3
New York	115,084	13.6	66,034	10.9	3,727	15.8	3,418	15.9
Massachusetts	97,010	11.5	81,154	13.4	3,023	12.8	2,985	13.8
Washington	66,138	7.8	61,223	10.1	1,280	5.4	1,249	5.8
Ohio	60,701	7.2	34,397	5.7	1,458	6.2	1,432	6.6
District of Columbia	58,786	7.0	36,073	5.9	1,493	6.3	942	4.4
Illinois	41,910	5.0	25,392	4.2	1,318	5.6	1,131	5.2
Pennsylvania	39,955	4.7	26,447	4.4	1,434	6.1	1,200	5.6
Texas	30,930	3.7	21,015	3.5	625	2.8	573	2.7
Virginia	30,606	3.6	28,653	4.7	586	2.5	586	2.7
Missouri	14,587	1.7	10,992	1.8	463	2.0	424	2.0
Minnesota	13,703	1.6	7,454	1.2	364	1.5	331	1.5
Maryland	10,389	1.2	9,211	1.5	395	1.7	342	1.6
New Jersey	7,469	.9	3,312	.5	600	2.5	333	1.5
Michigan	7,295	.9	2,393	.4	222	.9	216	1.0
All other States	58,228	6.9	34,083	5.6	1,975	8.3	1,796	8.3

TABLE B–8.—*Total number of technicians employed in independent nonprofit institutions, by type of organization and field of employment, January 1970*

Type of organization	Total technicians		Engineering and physical sciences		Life sciences		Social sciences	
	Total	R&D	Total	R&D	Total	R&D	Total	R&D
Total	25,415	9,807	3,811	3,223	20,380	5,810	1,224	774
Research institutes	4,828	4,617	2,196	2,077	2,263	2,191	369	349
Nonprofit-administered FFRDC's[a]	1,546	1,443	1,030	949	268	267	248	227
Voluntary hospitals	18,228	3,133	421	111	17,394	2,990	413	32
Other nonprofit organizations	813	614	164	86	455	362	194	166
Societies and academies of science	160	128	19	13	114	102	27	13
Private foundations	152	152	56	56	69	69	27	27
Science exhibitors	214	189	13	10	115	99	86	80
Other nonprofit, n.e.c.	287	145	76	7	157	92	54	46

[a] Federally Funded Research and Development Centers.

TABLE B–9.—*Current expenditures for intramural R&D performance of independent nonprofit institutions, by source of funds, 1953–69*[a]

[Dollars in millions]

	Total	Federal Government	Industry	Other sources[b]
1953	$100	$54	$20	$26
1954	115	61	25	29
1955	126	68	28	30
1956	142	76	30	36
1957	163	85	30	48
1958	188	98	31	59
1959	225	126	35	64
1960	270	165	40	65
1961	347	224	41	82
1962	442	292	45	105
1963	521	361	46	114
1964	582	428	47	107
1965	646	474	53	119
1966	710	519	59	132
1967	753	548	66	139
1968	798	578	73	147
1969	845	607	81	157

[a] Does not include the intramural R&D expenditures of State or local government hospitals and science exhibitors, which are estimated to have totaled about $84 million in 1969.

[b] Includes funding from institutions' own funds, State and local governments, foundations, voluntary health agencies, and other sources including individuals.

TABLE B–10.—*Current expenditures for R&D performance of independent nonprofit institutions, by source of funds and field of science, 1964, 1966, and 1969*

[Dollars in thousands]

Item	1964[a]	1966[a]	1969	Annual percent change 1964-66	Annual percent change 1966-69
Total	$582,473	$710,048	$845,299	10.4	6.0
Source of funds					
Federal Government	428,298	519,346	606,595	10.1	5.3
State and local governments	4,868	7,794	16,854	(b)	(b)
Industry	46,559	59,301	81,272	12.9	11.1
Institutions' own funds	65,738	79,748	81,484	10.1	.7
Other sources[c]	37,010	43,859	59,094	8.9	10.4
Field of science					
Engineering	193,435	208,764	257,697	3.9	7.3
Physical and environmental sciences	101,486	133,048	120,513	14.5	3.2
Mathematics	31,469	39,388	35,401	11.9	3.5
Life sciences	200,552	230,730	265,967	7.3	4.9
Psychology	12,105	20,595	29,843	30.6	13.2
Social sciences	43,155	70,519	99,931	27.8	12.3
Other sciences, n.e.c.	271	7,004	35,947	(b)	(b)

[a] Data for voluntary hospitals were estimated for 1964. Estimates for 1966 were derived from the 1966-67 National Institutes of Health Hospital Survey.

[b] The annual rate of growth was not computed in instances where the base figure was less than $10 million.

[c] Includes funds received from voluntary health agencies; foundations, and individuals.

TABLE B–11.—*Current expenditures for R&D performance of independent nonprofit institutions, by type of institution, source of funds and R&D expenditure-size class, 1969*

[Dollars in thousands]

Source of funds	Total	R&D expenditure-size class			
		Less than $500	$500 to $999	$1,000 to $4,999	$5,000 or more
	All institutions				
Total	$845,299	$49,093	$49,680	$207,451	$539,075
Federal Government	606,595	22,069	28,847	131,169	424,510
State governments	10,795	762	1,827	3,740	4,466
Local governments	6,059	532	165	1,667	3,695
Foundations	28,431	4,702	3,758	11,216	8,755
Voluntary health agencies	8,297	1,006	910	3,603	2,778
Industry	81,272	3,698	1,099	11,648	64,827
Institutions' own funds	81,484	13,332	9,896	35,622	22,634
Other sources	22,366	2,992	3,178	8,786	7,410
	Research institutes				
Total	361,019	20,294	18,222	85,887	236,616
Federal Government	224,379	8,628	11,376	52,082	152,293
State governments	7,265	660	400	3,095	3,110
Local governments	2,430	205	165	824	1,236
Foundations	12,744	1,998	1,808	4,591	4,347
Voluntary health agencies	4,255	163	381	2,293	1,418
Industry	73,566	3,016	780	8,788	60,982
Institutions' own funds	25,904	3,618	2,289	10,841	9,156
Other sources	10,476	2,006	1,023	3,373	4,074
	Nonprofit-administered FFRDC's[a]				
Total	277,314	998	4,190	30,809	241,317
Federal Government	262,564	998	4,164	29,779	227,623
State governments	477	--------	--------	217	260
Local governments	2,912	--------	--------	524	2,388
Foundations	1,423	--------	13	178	1,232
Voluntary health agencies	--------	--------	--------	--------	--------
Industry	3,419	--------	--------	29	3,390
Institutions' own funds	5,003	--------	13	63	4,927
Other sources	1,516	--------	--------	19	1,497
	Voluntary hospitals				
Total	130,246	16,303	16,937	60,660	36,346
Federal Government	84,228	8,819	10,156	41,148	24,105
State governments	1,723	40	1,217	324	142
Local governments	193	33	--------	89	71
Foundations	9,069	2,089	886	3,534	2,560
Voluntary health agencies	3,890	791	455	1,310	1,334
Industry	1,773	255	311	881	326
Institutions' own funds	24,222	3,792	3,470	9,675	7,285
Other sources	5,148	484	442	3,699	523
	Other nonprofit organizations[b]				
Total	76,720	11,498	10,331	30,095	24,796
Federal Government	35,424	3,624	3,151	8,160	20,489
State governments	1,330	62	210	104	954
Local governments	524	294	--------	230	--------
Foundations	5,195	615	1,051	2,913	616
Voluntary health agencies	152	52	74	--------	26
Industry	2,514	427	8	1,950	129
Institutions' own funds	26,355	5,922	4,124	15,043	1,266
Other sources	5,226	502	1,713	1,695	1,316

[a] Federally Funded Research and Development Centers.

[b] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit, n.e.c.

TABLE B–12.—*Distribution of R&D expenditures among selected groups of independent nonprofit institutions with the largest R&D programs, 1964, 1966, and 1969*

[Percent of total]

Independent nonprofit institutions ranked according to current expenditures for R&D performance	Current R&D expenditures			Federally financed R&D expenditures		
	1964	1966	1969	1964	1966	1969
First 4	31.9	28.5	28.6	38.3	33.4	32.3
First 8	44.6	42.4	43.3	53.4	50.6	49.7
First 12	51.7	49.8	50.7	61.6	59.2	57.3
First 16	56.9	54.6	55.2	66.9	63.5	61.6
First 20	60.3	58.1	58.5	69.4	66.5	64.8

TABLE B–13.—*Current expenditures for R&D performance of independent nonprofit institutions, by type of institution, field of science, and R&D expenditures-size class, 1969*

[Dollars in thousands]

Field of science	R&D expenditures-size class				
	Total	Less than $500	$500 to $999	$1,000 to $4,999	$5,000 or more
	All institutions				
Total	$845,299	$49,093	$49,680	$207,451	$539,075
Engineering	257,697	1,417	330	8,051	247,899
Physical sciences	103,743	2,246	2,076	12,194	87,227
Environmental sciences	16,770	1,226	506	3,116	11,922
Mathematics	35,401	331	713	4,359	29,998
Life sciences	265,967	30,447	29,644	122,661	83,215
Psychology	29,843	2,526	2,537	12,014	12,766
Social sciences	99,931	9,527	13,209	35,543	41,652
Other sciences, n.e.c.	35,947	1,373	665	9,513	24,396
	Research institutes				
Total	361,019	20,294	18,222	85,887	236,616
Engineering	113,648	999	252	7,267	105,130
Physical sciences	47,990	1,162	1,969	7,135	37,724
Environmental sciences	8,293	725	506	651	6,411
Mathematics	14,252	132	193	3,207	10,720
Life sciences	101,073	10,472	10,405	48,373	31,823
Psychology	14,741	1,162	601	2,008	10,970
Social sciences	53,724	4,551	4,195	15,709	29,269
Other sciences, n.e.c.	7,298	1,091	101	1,537	4,569
	Nonprofit-administered FFRDC's[a]				
Total	277,314	998	4,190	30,809	241,317
Engineering	138,459	--------	--------	696	137,763
Physical sciences	46,561	--------	--------	335	46,226
Environmental sciences	5,045	--------	--------	160	4,885
Mathematics	20,195	--------	--------	994	19,201
Life sciences	14,073	--------	--------	4,068	10,005
Psychology	5,717	--------	70	4,559	1,088
Social sciences	32,049	998	4,120	14,977	11,954
Other sciences, n.e.c.	15,215	--------	--------	5,020	10,195
	Voluntary hospitals				
Total	130,246	16,303	16,937	60,660	36,346
Engineering	153	96	--------	--------	57
Physical sciences	2,137	709	107	182	1,139
Environmental sciences	79	44	--------	35	--------
Mathematics	738	199	492	47	--------
Life sciences	123,166	14,391	15,923	58,635	34,217
Psychology	3,192	676	255	1,553	708
Social sciences	415	74	159	182	--------
Other sciences, n.e.c.	366	114	1	26	225
	Other nonprofit organizations[b]				
Total	76,720	11,498	10,331	30,095	24,796
Engineering	5,437	322	78	88	4,949
Physical sciences	7,055	375	--------	4,542	2,138
Environmental sciences	3,353	457	--------	2,270	626
Mathematics	216	--------	28	111	77
Life sciences	27,655	5,584	3,316	11,585	7,170
Psychology	6,193	688	1,611	3,894	--------
Social sciences	13,743	3,904	4,735	4,675	429
Other sciences, n.e.c.	13,068	168	563	2,930	9,407

[a] Federally Funded Research and Development Centers.
[b] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit, n.e.c.

TABLE B–14.—*Geographic distribution of selected financial characteristics of independent nonprofit institutions, 1969*

[Dollars in thousands]

Geographic location	Total expenditures all activities	Intramural research and development		
		Current		Capital
		Total	Federal	Total
United States, total	$3,421,916	$845,299	$606,595	$53,039
New England	477,938	104,100	85,385	13,495
Maine	14,909	2,285	1,942	109
New Hampshire	.....	.....	.....	.....
Vermont	3,359	125	70	.....
Massachusetts	371,500	97,010	81,154	13,283
Rhode Island	33,335	1,450	208	.....
Connecticut	54,835	3,230	2,011	103
Middle Atlantic	1,070,209	162,508	95,793	9,233
New York	741,573	115,084	66,034	6,169
New Jersey	79,763	7,469	3,312	650
Pennsylvania	248,873	39,955	26,447	2,414
East North Central	696,925	111,530	63,204	11,910
Ohio	253,668	60,701	34,397	10,147
Indiana	36,974	986	474	338
Illinois	314,04[illegible]	41,910	25,392	1,305
Michigan	91,565	7,295	2,393	102
Wisconsin	672	638	548	18
West North Central	216,250	30,169	18,981	1,786
Minnesota	101,225	13,703	7,454	691
Iowa	3,113	757	.....	4
Missouri	85,462	14,587	10,992	1,059
North Dakota	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....
Kansas	26,450	1,122	535	32
South Atlantic	287,064	109,632	80,821	2,997
Delaware	275	250	.....	25
Maryland	42,975	10,389	9,211	289
District of Columbia	179,165	58,786	36,073	1,702
Virginia	30,707	30,606	28,653	69
West Virginia	1,000	1,000	1,000	.....
North Carolina	9,805	6,317	4,908	625
South Carolina	.....	.....	.....	.....
Georgia	670	670	670	.....
Florida	22,467	1,614	306	287
East South Central	44,595	10,227	5,797	1,210
Kentucky	2,765	1,939	566	45
Tennessee	34,813	2,316	1,345	120
Alabama	7,017	5,972	3,886	1,045
Mississippi	.....	.....	.....	.....
West South Central	61,214	37,011	24,470	2,533
Arkansas	.....	.....	.....	.....
Louisiana	21,129	3,062	1,368	208
Oklahoma	4,162	3,019	2,087	238
Texas	35,923	30,930	21,015	2,087
Mountain	68,479	12,491	5,737	749
Montana	.....	.....	.....	.....
Idaho	.....	.....	.....	.....
Wyoming	.....	.....	.....	.....
Colorado	38,053	6,265	801	487
New Mexico	4,847	4,719	4,159	10
Arizona	16,121	1,485	761	252
Utah	9,458	22	16	.....
Nevada	.....	.....	.....	.....
Pacific	499,242	267,631	226,407	9,126
Washington	112,702	66,138	61,223	4,317
Oregon	28,569	6,458	5,604	274
California	349,075	192,508	158,762	4,477
Alaska	.....	.....	.....	.....
Hawaii	8,896	2,527	818	58

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TABLE B–15.—*Total number of scientists and engineers employed in research institutes, by field of employment and level of educational attainment, January 1965, 1967, and 1970*

Item	1965	1967	1970
Total	10,861	12,398	10,105
	Field of employment		
Engineers	2,081	2,503	2,294
Physical scientists	2,116	2,298	1,874
Mathematicians	1,537	1,614	535
Life scientists	3,115	3,501	3,179
Psychologists	844	1,037	555
Social scientists	1,168	1,445	1,668
	Educational attainment		
Ph. D. or Sc.D.	(a)	2,980	3,080
M.D., D.D.S., etc.	(a)	820	723
Master's	(a)	2,928	2,636
Bachelor's or the equivalent	(a)	5,670	3,666

[a] Not available.

TABLE B–16.—*Current expenditures for R&D performance of research institutes, by source of funds and field of science, 1964, 1966, and 1969*

[Dollars in thousands]

Item	1964	1966	1969	Annual percent change	
				1964-66	1966-69
Total	$274,251	$323,533	$361,019	8.6	3.7
	Source of funds				
Federal Government	183,589	212,490	224,379	7.6	1.8
State and local governments	2,192	3,609	9,695	(a)	(a)
Industry	44,154	55,959	73,566	12.6	9.5
Institutions' own funds	28,134	28,310	25,904	.3	—2.9
Other sources [b]	16,182	23,165	27,475	19.6	5.9
	Field of science				
Engineering	75,205	85,364	113,648	6.5	10.0
Physical and environmental sciences	67,887	77,728	56,283	7.0	—10.2
Mathematics	14,878	16,394	14,252	5.0	—4.6
Life sciences	80,624	91,138	101,073	6.3	3.5
Psychology	6,776	11,057	14,741	(b)	10.1
Social sciences	28,881	41,852	53,724	20.4	8.7
Other sciences, n.e.c.	--------	--------	7,298	--------	(b)

[a] The annual rate of growth was not computed in instances where the base was less than $10 million.

[b] Includes funds received from voluntary health agencies, private foundations, and individuals.

TABLE B–17.—*Distribution of R&D expenditures among selected groups of research institutes with the largest R&D programs, 1964, 1966, and 1969*

[Percent of total]

Research institutes ranked according to current expenditures for R&D performance	Current R&D expenditures			Federally financed R&D expenditures		
	1964	1966	1969	1964	1966	1969
First 4	40.6	41.3	43.6	45.6	46.4	45.7
First 8	54.5	52.3	54.2	60.5	56.1	57.2
First 12	62.3	59.7	62.6	68.2	64.6	65.6
First 16	67.0	65.6	68.2	72.2	70.2	71.6
First 20	70.6	70.4	72.3	75.3	75.6	75.2

TABLE B–18.—*Total number of scientists and engineers employed in nonprofit-administered FFRDC's,[a] by field of employment and level of educational attainment, January 1965, 1967, and 1970*

Item	1965	1967	1970
Total	4,010	5,495	6,057
Field of employment			
Engineers	2,046	2,708	2,629
Physical scientists	692	1,031	1,053
Mathematicians	675	733	759
Life scientists	64	84	153
Psychologists	45	133	281
Social scientists	488	806	1,182
Level of educational attainment			
Ph. D. or Sc.D.	(b)	1,121	1,341
M.D., D.D.S., etc.	(b)	36	54
Master's	(b)	1,878	2,195
Bachelor's or the equivalent	(b)	2,460	2,467

[a] Federally Funded Research and Development Centers.
[b] Not available.

TABLE B–19.—*Distribution of employment of scientists and engineers among selected groups of nonprofit-administered FFRDC's[a] with the largest R&D programs, January 1965, 1967, and 1970*

[Percent of total]

FFRDC's ranked according to current expenditures for R&D performance	1965	1967	1970
First 4	82.6	75.0	72.3
First 8	98.3	91.8	83.6
First 12[b]	100.0	96.3	89.1
First 16	(b)	98.2	94.0
First 20	(b)	99.3	97.3

[a] Federally Funded Research and Development Centers.
[b] Only 10 institutions were classified as FFRDC's.

TABLE B–20.—*Total number of scientists and engineers employed in nonprofit-administered FFRDC's, by field of employment and sponsoring Federal agency, January 1970*[a]

Field of employment	Total	Defense	Atomic Energy Comm.	Health Educ. & Welfare
Total	6,057	3,987	1,168	902
Engineers	2,629	2,105	510	14
Physical scientists	1,053	644	383	26
Mathematicians	759	665	55	39
Life scientists	153	12	118	23
Psychologists	281	115	6	160
Social scientists	1,182	446	96	640

[a] All scientists and engineers at nonprofit-administered Federally Funded Research and Development Centers are engaged in R&D performance.

TABLE B–21.—*Current expenditures for R&D performance of nonprofit-administered FFRDC's,*[a] *by source of funds and field of science, 1964, 1966, and 1969*

[Dollars in thousands]

Item	1964	1966	1969
Total	$168,793	$213,950	$277,314
	Source of funds		
Federal Government	167,415	210,888	262,564
State and local governments	4	519	[b]3,389
Industry	--------	[c]450	[d]3,419
Institutions' own funds	1,256	2,017	5,003
Other sources[e]	118	76	2,939
	Field of science		
Engineering	113,018	119,127	138,459
Physical and environmental sciences	24,716	44,098	51,606
Mathematics	14,821	21,988	20,195
Life sciences	5,117	7,232	14,073
Psychology	1,037	2,464	5,717
Social sciences	10,084	19,041	32,049
Other sciences, n.e.c.	--------	--------	15,215

[a] Federally Funded Research and Development Centers.
[b] The RAND Corp. accounted for 60 percent of this amount.
[c] Performed completely by Pacific Northwest Laboratories.
[d] More than $3 million of this amount was performed by Pacific Northwest Laboratories.
[e] Includes funds received from voluntary health agencies, foundations, and individuals.

TABLE B–22.—*Current expenditures for R&D performance in nonprofit-administered FFRDC's,[a] by field of science and sponsoring Federal agency, 1969*

[Dollars in thousands]

Field of science	Total	Defense	Atomic Energy Comm.	Health Educ. & Welfare
Total	$277,314	$177,780	$67,246	$32,288
Engineering	138,459	108,835	29,293	331
Physical sciences	46,561	24,593	21,431	537
Environmental sciences	5,045	1,079	3,931	35
Mathematics	20,195	17,610	1,268	1,317
Life sciences	14,073	1,068	11,323	1,682
Psychology	5,717	5,205	--------	512
Social sciences	32,049	11,111	--------	20,938
Other sciences, n.e.c.[b]	15,215	8,279	--------	6,936

[a] Federally Funded Research and Development Centers.
[b] This entry reflects expenditures for interdisciplinary projects.

TABLE B–23.—*Distribution of R&D expenditures among selected groups of nonprofit-administered FFRDC's[a] with the largest R&D programs, 1964, 1966, and 1969*

[Percent of total]

FFRDC's ranked according to current expenditures for R&D performance	1964	1966	1969
First 4	86.7	77.8	74.1
First 8	99.3	94.8	87.0
First 12[b]	100.0	98.0	92.3
First 16	(b)	99.1	96.1
First 20	(b)	99.5	98.1

[a] Federally Funded Research and Development Centers.
[b] Only 10 institutions were classified as nonprofit-administered FFRDC's in 1964.

55[illegible]

TABLE B–24.—*Total number of scientists and engineers employed in other nonprofit organizations,*[a] *by field of employment and level of educational attainment, January 1965, 1967, and 1970*

Item	1965	1967	1970
Total	2,445	3,111	3,159
	Field of employment		
Engineers	93	90	163
Physical scientists	484	740	566
Mathematicians	138	15	166
Life scientists	1,111	1,177	1,120
Psychologists	234	502	352
Social scientists	385	587	786
	Level of educational attainment		
Ph. D. or Sc.D.	(b)	1,193	1,144
M.D., D.D.S., etc.	(b)	267	306
Master's	(b)	810	781
Bachelor's or the equivalent	(b)	841	928

[a] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit organizations, n.e.c.

[b] Not available.

TABLE B–25.—*Current expenditures for R&D performance of other nonprofit organizations,*[a] *by source of funds and field of science, 1964, 1966, and 1969*

[Dollars in thousands]

Item	1964	1966	1969
Total	$43,029	$56,914	$76,720
	Source of funds		
Federal Government	17,816	24,656	35,424
State and local governments	983	1,638	1,854
Industry	1,055	948	2,514
Institutions' own funds	18,428	24,259	26,355
Other sources[b]	4,747	5,413	10,573
	Field of science		
Engineering	5,099	4,137	5,437
Physical and environmental sciences	7,243	9,255	10,408
Mathematics	1,223	350	216
Life sciences	20,651	22,995	27,655
Psychology	1,930	4,240	6,193
Social sciences	6,883	9,258	13,743
Other sciences, n.e.c.	-----	6,679	13,068

[a] Includes societies and academies of science, private foundations, science exhibitors, and other nonprofit organizations, n.e.c.

[b] Includes funds received from voluntary health agencies, foundations, and individuals.

APPENDIX C

Reproduction of Covering Letter, Summary Questionnaires, and Instructions

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

April 10, 1970

Dear Sir:

The National Science Foundation requests your cooperation in its Survey of R&D Performance of Independent Nonprofit Institutions, 1970. The enclosed survey questionnaire seeks information on the employment of scientific and technical personnel and the financing of intramural R&D performance in the sciences and engineering.

This survey is part of NSF's continuing program of surveys and studies designed to assemble information on the national resources allocated to the advancement of science and technology. Similar surveys are conducted in other sectors of the economy, including industry, universities and colleges, and government. Such information is needed by the National Science Foundation, other Government agencies, and all other national groups concerned with formulating and evaluating policies and programs to strengthen the scientific capabilities of the Nation.

Also enclosed is a self-addressed postcard requesting the name and title of the official designated to complete the questionnaire for your institution. The prompt return of this postcard to the National Science Foundation will insure that any inquiries regarding your institution's participation in the survey will be directed to the appropriate official. If any questions arise regarding the interpretation of the survey questionnaire, please write or call Dr. Joseph H. Schuster at the Foundation's Office of Economic and Manpower Studies (Area Code 202, 632-4080).

Your cooperation in this survey will be appreciated.

Sincerely yours,

Charles E. Falk

Charles E. Falk
Planning Director

Enclosures

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NSF FORM 514, March 1970
Supersedes NSF Form 9D-13a

Budget Bureau No. 99-S70002
Approval Expires: March 31, 1971

Survey of R&D Performance of Independent Nonprofit Institutions, 1970

Organizations are requested to complete and return this form within 30 days to:
National Science Foundation
Washington, D.C. 20550
Attn: UNISG

Please indicate below the number of any item that should not be published with institutional identification:

_____

_____

NAME AND ADDRESS OF ORGANIZATION
(Please correct if name or address has changed)

Independent Nonprofit Institutions

426

(PLEASE RETURN THIS COPY)

Insert "0" in total cell rather than leave blank.

PART I – PERSONNEL DATA

(Includes items 1 to 3 of the survey questionnaire)

Personnel data are to be reported as of January 1970 or as close as possible thereto.

Item 1

Total employment of your organization in all activities (full time and part time), by selected occupational group and employment status, January 1970

Occupational group		Total (1)	Full time (2)	Part time (3)
a. Scientists and engineers (total)	0110	23,652	21,051	2,601
(1) Number primarily in R&D	0111	21,556	19,352	2,204
(2) Number primarily in other activities	0112	2,096	1,699	397
b. Technicians	0120	25,415	21,001	4,414
c. Other employees	0130	230,531	189,306	41,225
d. Total (sum of a to c)	0100	279,598	231,358	48,240

Item 2

Scientists and engineers, by field in which *primarily* employed and highest earned degree, January 1970 (See item 1a, column 1)

Field of employment		Total (1)	Ph.D. or Sc.D. (2)	M.D., D.D.S., etc. (3)	Master's (4)	Bachelor's or the equivalent (5)
a. Engineers	0210	5,208	788	3	1,985	2,432
b. Physical scientists	0220	3,669	1,300	36	911	1,422
c. Mathematicians	0230	1,499	267	3	544	685
d. Life scientists	0240	8,008	2,550	2,962	785	1,711
e. Psychologists	0250	1,412	688	60	376	288
f. Social scientists	0260	3,856	1,008	34	1,514	1,300
g. Total *(sum of a to f)* [a]	0200	23,652	6,601	3,098	6,115	7,838

Item 3

Technicians, by field and function in which *primarily* employed, January 1970 (See item 1b, column 1)

Field of employment		Total (1)	R&D (2)	Other activities (3)
a. Engineering and physical science technicians	0310	3,811	3,223	588
b. Life science technicians	0320	20,380	5,810	14,570
c. Social science technicians	0330	1,224	774	450
d. Total *(sum of a to c)* [b]	0300	25,415	9,807	15,608

[a] Total in item 2g, column 1, *should be the same* as the total in item 1a, column 1.

[b] Total in item 3d, column 1, *should be the same* as the total in item 1b, column 1.

(See Reverse Side)

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PART II—FINANCIAL DATA

(Includes items 4 to 6 of the survey questionnaire)

Item 4 — Total expenditures of your organization in all activities (current and capital), by type of expenditure, during the 1969 accounting period

Type of expenditure		Thousands of dollars
a. Current R&D expenditures [c]	0410	$ 845,299
b. Capital R&D expenditures [c]	0420	53,039
c. All other expenditures	0430	2,523,578
d. Total *(sum of a to c)*	0400	$ 3,421,916

Item 5 — Current expenditures for research and development, by source of funds, 1969 (See item 4a)

Source of funds		Thousands of dollars
a. Federal Government	0510	$ 606,595
b. State government	0520	10,795
c. Local government	0530	6,059
d. Foundations	0540	28,431
e. Voluntary health agencies	0550	8,297
f. Industry	0560	81,272
g. Institution's own funds	0570	81,484
h. Other sources	0580	22,366
i. Total *(sum of a to h)* [d]	0500	$ 845,299

Item 6 — Current expenditures for research and development, by field of science, 1969 (See item 4a)

Field of science		Thousands of dollars
a. Engineering	0610	$ 257,697
b. Physical sciences	0620	103,743
c. Environmental sciences	0630	16,770
d. Mathematics	0640	35,401
e. Life sciences	0650	265,967
f. Psychology	0660	29,843
g. Social sciences	0670	99,931
h. Other sciences, NEC	0680	35,947
i. Total *(sum of a to h)* [e]	0600	$ 845,299

Item 7 — Describe briefly the types of research projects carried out by your organization in 1969. If you prefer, attach a statement or a report of your organization that contains such information.

NAME OF PERSON SUBMITTING THIS FORM	TITLE
NAME OF INSTITUTION	ADDRESS (number, street, city, state, ZIP code)
AREA CODE, TELEPHONE NO., EXT. / DATE	

[c] Amounts reported in items 4a and 4b relate only to intramural R&D performance.

[d] Total in item 5i should be the same as totals in items 4a and 6i.

[e] Total in item 6i should be the same as totals in items 4a and 5i.

NSF FORM 514, March 1970
Supersedes NSF Form 9D-13a

Budget Bureau No. 99-S70002
Approval Expires: March 31, 1971

Survey of R&D Performance of Independent Nonprofit Institutions, 1970

Organizations are requested to complete and return this form within 30 days to:
National Science Foundation
Washington, D.C. 20550
Attn: UNISG

Please indicate below the number of any item that should not be published with institutional identification:

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NAME AND ADDRESS OF ORGANIZATION
(Please correct if name or address has changed)

Research Institutes

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Insert "0" in total cell rather than leave blank.

PART I – PERSONNEL DATA

(Includes items 1 to 3 of the survey questionnaire)

Personnel data are to be reported as of January 1970 or as close as possible thereto.

Item 1

Total employment of your organization in all activities (full time and part time), by selected occupational group and employment status, January 1970

Occupational group		Total (1)	Full time (2)	Part time (3)
a. Scientists and engineers (total)	0110	10,105	9,106	999
(1) Number primarily in R&D	0111	9,692	8,795	897
(2) Number primarily in other activities	0112	413	311	102
b. Technicians	0120	4,828	4,023	805
c. Other employees	0130	9,382	8,356	1,026
d. Total (sum of a to c)	0100	24,315	21,485	2,830

Item 2

Scientists and engineers, by field in which *primarily* employed and highest earned degree, January 1970 (See item 1a, column 1)

Field of employment		Total (1)	Ph.D. or Sc.D. (2)	M.D., D.D.S., etc. (3)	Master's (4)	Bachelor's or the equivalent (5)
a. Engineers	0210	2,294	390	3	879	1,022
b. Physical scientists	0220	1,874	693	18	440	723
c. Mathematicians	0230	535	134	1	168	232
d. Life scientists	0240	3,179	1,213	685	363	918
e. Psychologists	0250	555	225	13	162	155
f. Social scientists	0260	1,668	425	3	624	616
g. Total *(sum of a to f)* [a]	0200	10,105	3,080	723	2,636	3,666

Item 3

Technicians, by field and function in which *primarily* employed, January 1970 (See item 1b, column 1)

Field of employment		Total (1)	R&D (2)	Other activities (3)
a. Engineering and physical science technicians	0310	2,196	2,077	119
b. Life science technicians	0320	2,263	2,191	72
c. Social science technicians	0330	369	349	20
d. Total *(sum of a to c)* [b]	0300	4,828	4,617	211

[a] Total in item 2g, column 1, *should be the same* as the total in item 1a, column 1.

[b] Total in item 3d, column 1, *should be the same* as the total in item 1b, column 1.

(See Reverse Side)

PART II—FINANCIAL DATA

(Includes items 4 to 6 of the survey questionnaire)

Item 4 — Total expenditures of your organization in all activities (current and capital), by type of expenditure, during the 1969 accounting period

Type of expenditure		Thousands of dollars
a. Current R&D expenditures [c]	0410	$ 361,019
b. Capital R&D expenditures [c]	0420	29,255
c. All other expenditures	0430	34,389
d. Total *(sum of a to c)*	0400	$ 424,663

Item 5 — Current expenditures for research and development, by source of funds, 1969 (See item 4a)

Source of funds		Thousands of dollars
a. Federal Government	0510	$ 224,379
b. State government	0520	7,265
c. Local government	0530	2,430
d. Foundations	0540	12,744
e. Voluntary health agencies	0550	4,255
f. Industry	0560	73,566
g. Institution's own funds	0570	25,904
h. Other sources	0580	10,476
i. Total *(sum of a to h)* [d]	0500	$ 361,019

Item 6 — Current expenditures for research and development, by field of science, 1969 (See item 4a)

Field of science		Thousands of dollars
a. Engineering	0610	$ 113,648
b. Physical sciences	0620	47,990
c. Environmental sciences	0630	8,293
d. Mathematics	0640	14,252
e. Life sciences	0650	101,073
f. Psychology	0660	14,741
g. Social sciences	0670	53,724
h. Other sciences, NEC	0680	7,298
i. Total *(sum of a to h)* [e]	0600	$ 361,019

Item 7 — Describe briefly the types of research projects carried out by your organization in 1969. If you prefer, attach a statement or a report of your organization that contains such information.

NAME OF PERSON SUBMITTING THIS FORM	TITLE
NAME OF INSTITUTION	ADDRESS (number, street, city, state, ZIP code)
AREA CODE, TELEPHONE NO., EXT / DATE	

[c] Amounts reported in items 4a and 4b relate only to intramural R&D performance.

[d] Total in item 5i should be the same as totals in items 4a and 6i.

[e] Total in item 6i should be the same as totals in items 4a and 5i.

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NSF FORM 514, March 1970
Supersedes NSF Form 9D-13a

Budget Bureau No. 99-S70002
Approval Expires: March 31, 1971

Survey of R&D Performance of Independent Nonprofit Institutions, 1970

Organizations are requested to complete and return this form within 30 days to:
National Science Foundation
Washington, D.C. 20550
Attn: UNISG

Please indicate below the number of any item that should not be published with institutional identification:

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NAME AND ADDRESS OF ORGANIZATION
(Please correct if name or address has changed)

Nonprofit-administered
FFRDC's

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Insert "0" in total cell rather than leave blank.

PART I – PERSONNEL DATA

(Includes items 1 to 3 of the survey questionnaire)

Personnel data are to be reported as of January 1970 or as close as possible thereto.

Item 1

Total employment of your organization in all activities (full time and part time), by selected occupational group and employment status, January 1970

Occupational group		Total (1)	Full time (2)	Part time (3)
a. Scientists and engineers (total)	0110	6,057	5,924	133
(1) Number primarily in R&D	0111	6,057	5,924	133
(2) Number primarily in other activities	0112	-	-	-
b. Technicians	0120	1,546	1,508	38
c. Other employees	0130	6,256	5,927	329
d. Total (sum of a to c)	0100	13,859	13,359	500

Item 2

Scientists and engineers, by field in which *primarily* employed and highest earned degree, January 1970 (See item 1a, column 1)

Field of employment		Total (1)	Ph.D. or Sc.D. (2)	M.D., D.D.S., etc. (3)	Master's (4)	Bachelor's or the equivalent (5)
a. Engineers	0210	2,629	363	-	1,025	1,241
b. Physical scientists	0220	1,053	370	1	313	369
c. Mathematicians	0230	759	105	1	315	338
d. Life scientists	0240	153	53	48	25	27
e. Psychologists	0250	281	154	-	69	58
f. Social scientists	0260	1,182	296	4	448	434
g. Total *(sum of a to f)* [a]	0200	6,057	1,341	54	2,195	2,467

Item 3

Technicians, by field and function in which *primarily* employed, January 1970 (See item 1b, column 1)

Field of employment		Total (1)	R&D (2)	Other activities (3)
a. Engineering and physical science technicians	0310	1,030	949	81
b. Life science technicians	0320	268	267	1
c. Social science technicians	0330	248	227	21
d. Total *(sum of a to c)* [b]	0300	1,546	1,443	103

[a] Total in item 2g, column 1, *should be the same* as the total in item 1a, column 1.

[b] Total in item 3d, column 1, *should be the same* as the total in item 1b, column 1.

(See Reverse Side)

PART II—FINANCIAL DATA

(Includes items 4 to 6 of the survey questionnaire)

Item 4 — Total expenditures of your organization in all activities (current and capital), by type of expenditure, during the 1969 accounting period

Type of expenditure		Thousands of dollars
a. Current R&D expenditures [c]	0410	$ 277,314
b. Capital R&D expenditures [c]	0420	4,418
c. All other expenditures	0430	12,910
d. Total *(sum of a to c)*	0400	$ 294,642

Item 5 — Current expenditures for research and development, by source of funds, 1969 (See item 4a)

Source of funds		Thousands of dollars
a. Federal Government	0510	$ 262,564
b. State government	0520	477
c. Local government	0530	2,912
d. Foundations	0540	1,423
e. Voluntary health agencies	0550	-
f. Industry	0560	3,419
g. Institution's own funds	0570	5,003
h. Other sources	0580	1,516
i. Total *(sum of a to h)* [d]	0500	$ 277,314

Item 6 — Current expenditures for research and development, by field of science, 1969 (See item 4a)

Field of science		Thousands of dollars
a. Engineering	0610	$ 138,459
b. Physical sciences	0620	46,561
c. Environmental sciences	0630	5,045
d. Mathematics	0640	20,195
e. Life sciences	0650	14,073
f. Psychology	0660	5,717
g. Social sciences	0670	32,049
h. Other sciences, NEC	0680	15,215
i. Total *(sum of a to h)* [e]	0600	$ 277,314

Item 7 — Describe briefly the types of research projects carried out by your organization in 1969. If you prefer, attach a statement or a report of your organization that contains such information.

NAME OF PERSON SUBMITTING THIS FORM	TITLE
NAME OF INSTITUTION	ADDRESS (number, street, city, state, ZIP code)
AREA CODE, TELEPHONE NO., EXT. / DATE	

[c] Amounts reported in items 4a and 4b relate only to intramural R&D performance.

[d] Total in item 5i should be the same as totals in items 4a and 6i.

[e] Total in item 6i should be the same as totals in items 4a and 5i.

NSF FORM 514, March 1970
Supersedes NSF Form 9D-13a

Budget Bureau No. 99-S70002
Approval Expires: March 31, 1971

Survey of R&D Performance of Independent Nonprofit Institutions, 1970

Organizations are requested to complete and return this form within 30 days to:
National Science Foundation
Washington, D.C. 20550
Attn: UNISG

Please indicate below the number of any item that should not be published with institutional identification:

_____

_____

NAME AND ADDRESS OF ORGANIZATION
(Please correct if name or address has changed)

Voluntary Nonprofit Hospitals

147

(PLEASE RETURN THIS COPY)

Insert "0" in total cell rather than leave blank.

PART I – PERSONNEL DATA

(Includes items 1 to 3 of the survey questionnaire)

Personnel data are to be reported as of January 1970 or as close as possible thereto.

Item 1

Total employment of your organization in all activities (full time and part time), by selected occupational group and employment status, January 1970

Occupational group		Total (1)	Full time (2)	Part time (3)
a. Scientists and engineers (total)	0110	4,331	3,242	1,089
(1) Number primarily in R&D	0111	3,911	2,933	978
(2) Number primarily in other activities	0112	420	309	111
b. Technicians	0120	18,228	14,815	3,413
c. Other employees	0130	198,724	160,440	38,284
d. Total (sum of a to c)	0100	221,283	178,497	42,786

Item 2

Scientists and engineers, by field in which *primarily* employed and highest earned degree, January 1970 (See item 1a, column 1)

Field of employment		Total (1)	Ph.D. or Sc.D. (2)	M.D., D.D.S., etc. (3)	Master's (4)	Bachelor's or the equivalent (5)
a. Engineers	0210	116	15	-	33	68
b. Physical scientists	0220	176	58	11	25	82
c. Mathematicians	0230	39	8	-	8	23
d. Life scientists	0240	3,556	830	1,955	242	529
e. Psychologists	0250	224	112	46	44	22
f. Social scientists	0260	220	13	3	151	53
g. Total *(sum of a to f)* [a]	0200	4,331	1,036	2,015	503	777

Item 3

Technicians, by field and function in which *primarily* employed, January 1970 (See item 1b, column 1)

Field of employment		Total (1)	R&D (2)	Other activities (3)
a. Engineering and physical science technicians	0310	421	111	310
b. Life science technicians	0320	17,394	2,990	14,404
c. Social science technicians	0330	413	32	381
d. Total *(sum of a to c)* [b]	0300	18,228	3,133	15,095

[a] Total in item 2g, column 1, *should be the same* as the total in item 1a, column 1.

[b] Total in item 3d, column 1, *should be the same* as the total in item 1b, column 1.

(See Reverse Side)

PART II—FINANCIAL DATA

(Includes items 4 to 6 of the survey questionnaire)

Item 4 — Total expenditures of your organization in all activities (current and capital), by type of expenditure, during the 1969 accounting period

Type of expenditure		Thousands of dollars
a. Current R&D expenditures [c]	0410	$ 130,246
b. Capital R&D expenditures [c]	0420	15,938
c. All other expenditures	0430	2,131,131
d. Total *(sum of a to c)*	0400	$ 2,277,315

Item 5 — Current expenditures for research and development, by source of funds, 1969 (See item 4a)

Source of funds		Thousands of dollars
a. Federal Government	0510	$ 84,228
b. State government	0520	1,723
c. Local government	0530	193
d. Foundations	0540	9,069
e. Voluntary health agencies	0550	3,890
f. Industry	0560	1,773
g. Institution's own funds	0570	24,222
h. Other sources	0580	5,148
i. Total *(sum of a to h)* [d]	0500	$ 130,246

Item 6 — Current expenditures for research and development, by field of science, 1969 (See item 4a)

Field of science		Thousands of dollars
a. Engineering	0610	$ 153
b. Physical sciences	0620	2,137
c. Environmental sciences	0630	79
d. Mathematics	0640	738
e. Life sciences	0650	123,166
f. Psychology	0660	3,192
g. Social sciences	0670	415
h. Other sciences, NEC	0680	366
i. Total *(sum of a to h)* [e]	0600	$ 130,246

Item 7 — Describe briefly the types of research projects carried out by your organization in 1969. If you prefer, attach a statement or a report of your organization that contains such information.

NAME OF PERSON SUBMITTING THIS FORM	TITLE
NAME OF INSTITUTION	ADDRESS (number, street, city, state, ZIP code)
AREA CODE, TELEPHONE NO., EXT. / DATE	

[c] Amounts reported in items 4a and 4b relate only to intramural R&D performance.

[d] Total in item 5i should be the same as totals in items 4a and 6i.

[e] Total in item 6i should be the same as totals in items 4a and 5i.

NSF FORM 514, March 1970
Supersedes NSF Form 9D-13a

Budget Bureau No. 99-S70002
Approval Expires: March 31, 1971

Survey of R&D Performance of Independent Nonprofit Institutions, 1970

Organizations are requested to complete and return this form within 30 days to:
National Science Foundation
Washington, D.C. 20550
Attn: UNISG

Please indicate below the number of any item that should not be published with institutional identification:

_____

_____

NAME AND ADDRESS OF ORGANIZATION
(Please correct if name or address has changed)

Other Nonprofit Organizations

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(PLEASE RETURN THIS COPY)

Insert "0" in total cell rather than leave blank.

PART I – PERSONNEL DATA

(Includes items 1 to 3 of the survey questionnaire)

Personnel data are to be reported as of January 1970 or as close as possible thereto.

Item 1

Total employment of your organization in all activities (full time and part time), by selected occupational group and employment status, January 1970

Occupational group		Total (1)	Full time (2)	Part time (3)
a. Scientists and engineers (total)	0110	3,159	2,779	380
(1) Number primarily in R&D	0111	1,896	1,700	196
(2) Number primarily in other activities	0112	1,263	1,079	184
b. Technicians	0120	813	655	158
c. Other employees	0130	16,169	14,583	1,586
d. Total (sum of a to c)	0100	20,141	18,017	2,124

Item 2

Scientists and engineers, by field in which *primarily* employed and highest earned degree, January 1970 (See item 1a, column 1)

Field of employment		Total (1)	Ph.D. or Sc.D. (2)	M.D., D.D.S., etc. (3)	Master's (4)	Bachelor's or the equivalent (5)
a. Engineers	0210	169	20	-	48	101
b. Physical scientists	0220	566	179	6	133	248
c. Mathematicians	0230	166	20	1	53	92
d. Life scientists	0240	1,120	454	274	155	237
e. Psychologists	0250	352	197	1	101	53
f. Social scientists	0260	786	274	24	291	197
g. Total *(sum of a to f)* [a]	0200	3,159	1,144	306	781	928

Item 3

Technicians, by field and function in which *primarily* employed, January 1970 (See item 1b, column 1)

Field of employment		Total (1)	R&D (2)	Other activities (3)
a. Engineering and physical science technicians	0310	164	86	78
b. Life science technicians	0320	455	362	93
c. Social science technicians	0330	194	166	28
d. Total *(sum of a to c)* [b]	0300	813	614	199

[a] Total in item 2g, column 1, *should be the same* as the total in item 1a, column 1.

[b] Total in item 3d, column 1, *should be the same* as the total in item 1b, column 1.

(See Reverse Side)

PART II—FINANCIAL DATA

(Includes items 4 to 6 of the survey questionnaire)

Item 4 — Total expenditures of your organization in all activities (current and capital), by type of expenditure, during the 1969 accounting period

Type of expenditure		Thousands of dollars
a. Current R&D expenditures [c]	0410	$ 76,720
b. Capital R&D expenditures [c]	0420	3,428
c. All other expenditures	0430	345,148
d. Total *(sum of a to c)*	0400	$ 425,296

Item 5 — Current expenditures for research and development, by source of funds, 1969 (See item 4a)

Source of funds		Thousands of dollars
a. Federal Government	0510	$ 35,424
b. State government	0520	1,330
c. Local government	0530	524
d. Foundations	0540	5,195
e. Voluntary health agencies	0550	152
f. Industry	0560	2,514
g. Institution's own funds	0570	26,355
h. Other sources	0580	5,226
i. Total *(sum of a to h)* [d]	0500	$ 76,720

Item 6 — Current expenditures for research and development, by field of science, 1969 (See item 4a)

Field of science		Thousands of dollars
a. Engineering	0610	$ 5,437
b. Physical sciences	0620	7,055
c. Environmental sciences	0630	3,353
d. Mathematics	0640	216
e. Life sciences	0650	27,655
f. Psychology	0660	6,193
g. Social sciences	0670	13,743
h. Other sciences, NEC	0680	13,068
i. Total *(sum of a to h)* [e]	0600	$ 76,720

Item 7 — Describe briefly the types of research projects carried out by your organization in 1969. If you prefer, attach a statement or a report of your organization that contains such information.

NAME OF PERSON SUBMITTING THIS FORM	TITLE
NAME OF INSTITUTION	ADDRESS (number, street, city, state, ZIP code)
AREA CODE, TELEPHONE NO., EXT. / DATE	

[c] Amounts reported in items 4a and 4b relate only to intramural R&D performance.

[d] Total in item 5i should be the same as totals in items 4a and 6i.

[e] Total in item 6i should be the same as totals in items 4a and 5i.

NSF Form 514
Instruction Sheet

NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

Instructions for Survey of R&D Performance of Independent Nonprofit Institutions, 1970

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PART II. Financial Data

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Item 5. Current Expenditures for Research and Development, by Source of Funds . 4
Item 6. Current Expenditures for Research and Development, by Field of Science . 4

General Instructions

The National Science Foundation, an independent agency of the Federal Government, requests your cooperation in completing the attached questionnaire covering the manpower and financial data of your organization as they relate to science and engineering. The purpose of this survey is to obtain statistical data on the resources devoted to scientific and engineering activities by nonprofit organizations. The information obtained will assist the National Science Foundation in fulfilling its responsibility for the support of research and education in the sciences and engineering and in the formulation of recommendations on national science policy.

Where no specific records exist for statistical data requested in the form, reasonable estimates are acceptable. Please report for the entire organization including any unincorporated branches, divisions and departments. If separate offices and facilities are maintained in the United States in addition to those at the address to which the survey materials were mailed, please indicate the name and address of each of these facilities in the remarks section or on an attached sheet.

Definition of Research and Development

For the purposes of this questionnaire, research and development include.

(1) *Basic Research*–Basic research is directed toward increase of knowledge; it is research where the primary aim of the investigator is a fuller knowledge or understanding of the subject under study rather than a practical application thereof.

(2) *Applied Research*–Applied research is concerned with discovering new scientific knowledge primarily for its immediate or specific applications.

(3) *Development*–Development is technical activity or nonroutine problems encountered in translating research findings or other scientific knowledge into products or processes. Exclude production engineering and routine technical services such as quality control and testing.

Included in this definition is the preparation for publication of books and papers describing the results of the specific research and development, if carried out as an integral part of that research and development. Also included is the administration of research and development.

Classification of Fields

Listed below are the fields of science and engineering that are to be used in classifying employment (items 2 and 3) and R&D expenditures (item 6). Classify persons employed in interdisciplinary or multidisciplinary fields in the particular field in which their activities are most closely identified. However, R&D expenditures in interdisciplinary or multidisciplinary fields should be classified in "Other Sciences, N.E.C.," as indicated below. Also note that separate data on R&D expenditures in the physical sciences and environmental sciences, respectively, are requested in item 6, whereas personnel employed in these two fields should be reported as physical scientists in item 2 or as physical science technicians in item 3.

Engineering:	Aeronautical, astronautical, chemical, civil, electrical, mechanical, and other engineering; metallurgy; and materials.
Physical Sciences:	Astronomy, chemistry, and physics.
Environmental Sciences:	Atmospheric sciences, geological sciences, and oceanography.
Mathematical Sciences:	(Includes statistics and computer science.)
Life Sciences:	Biological sciences, clinical medical and other medical research. (Include biological and agricultural scientists and those medical scientists primarily engaged in research in this category, but exclude medical practitioners primarily engaged in patient care, dispensing drugs and services, or in diagnosis, etc.)
Psychological Sciences:	(Includes biological and social aspects.)
Social Sciences:	Anthropology, economics, history, linguistics, political science, and sociology
Other Sciences, N.E.C.:	To be used to classify expenditures for multidisciplinary and interdisciplinary R&D projects that cannot be classified into a specific field.

Part I – Personnel Data

(Includes items 1 to 3 of the survey questionnaire)

Item 1–Total Employment. Report the number of persons employed *directly* by your organization on a full- and part-time basis in all activities in the United States and in foreign countries during the mid-January pay period (the payroll period containing January 12, 1970). Do not include contributed services.

1a. *Scientists and Engineers*–Scientists and engineers for this survey are defined as all persons engaged in scientific or engineering work at a level which requires a knowledge equivalent at least to that acquired through completion of a 4-year college course with a major in one of the following fields, regardless of whether they hold a college degree in the field: physical, life, or social sciences, engineering, mathematics, or psychology.

In column (1) report total number of such persons employed full- and part-time by your organization in January 1970. Include all scientific and engineering personnel including all persons engaged in administrative and management activities requiring a scientific or engineering background. Include as scientists only those physicians, dentists, public health specialists, pharmacists, etc. who spend the greatest proportion of their time in clinical investigation or other R&D activities. Exclude all medical practitioners who spend the greatest proportion of their time providing patient care, dispensing drugs or services, or in diagnosis, etc. Exclude persons trained in science or engineering but currently employed in positions not requiring such training. The reporting institution is requested to use its own definition of what constitutes full- and part-time employment in columns (2) and (3).

Items 1a(1) and 1a(2)–The functional classification of professional personnel into research and development

0370

or other activities should be based on the function in which the person is primarily employed at the institution. For example, a person engaged in both research and development and other activities should be classified in the function in which he spends the greater portion of his time.

Under other activities 1a(2), report professional personnel not primarily employed in research and development as defined above. Examples of such activities are demonstration work, education, and dissemination of scientific information.

1b. *Technicians*–Include all persons employed in positions which involve technical work at a level requiring knowledge of engineering, mathematics, physical science, life science, psychology, or social science comparable to that acquired through formal post-high school training (less than a bachelor's degree), such as that obtained at technical institutes and junior colleges or through equivalent on-the-job training or experience. Some typical job titles include laboratory technician or assistant, physical science aide, engineering aide, statistical aide, draftsman and computer programmer. Exclude craftsmen such as electricians, carpenters, machinists, etc.

1c. *Other Employees*–Include all other persons employed by your organization except those already listed in 1a and 1b. Medical practitioners and other health-professional personnel who spend the greater portion of their time providing patient care, dispensing drugs or services or in diagnosis, etc., should be included in this category.

Item 2–Scientists and Engineers. Report scientists and engineers in the field in which they are primarily employed by the institution and by highest earned degree, January 1970 (see *Classification of Fields*, page 2). Personnel engaged in administration or community service should be classified in the field most closely related to their present employment at the institution.

For the purposes of this survey, earned degrees are classified in four categories as defined below:

a) Ph.D. or Sc.D. degrees include all such earned degrees. Individuals holding *both* the Ph.D. (or Sc.D.) degree and a first-professional degree, such as the M.D., should be included in column 2.

b) Include in column 3 individuals whose highest earned degrees are first-professional medical degrees that indicate the completion of the academic requirements based on programs that require at least 2 academic years of previous college work for entrance and require a total of at least 6 academic years of college work for completion. Specifically, include in column 3 first-professional degrees in Medicine (M.D.), Dentistry (D.D.S. or D.M.D.), Veterinary Medicine (D.V.M.), Chiropody or Podiatry (D.S.C. or D.P.), Optometry (O.D.), and Osteopathy (D.O.). Individuals holding *both* the Ph.D. (or Sc.D.) degree and a first-professional degree, such as the M.D., should be included in column 2 as mentioned in (a) above.

c) For the purposes of this survey, report all individuals with master's degrees (second-level degrees above the bachelor's degree and below the Ph.D.), in column 4, with the exception of those who also hold medical doctorates as described below. A person with an M.D., D.D.S., and other first-professional medical doctorate requiring at least 6 academic years of college work for completion should be reported in column 3, even if he also holds a master's degree in the arts or sciences or a second-level professional degree (e.g. Master in Surgery or Master of Science in Dentistry).

d) Report all individuals whose highest earned degree is the bachelor's degree or a 4- or five-year first-professional degree, or who have the equivalent in experience, even if they have not earned such a degree (column 5).

Item 3–Technicians. Report technicians by field and function in which primarily employed, January 1970. See instructions in 1b above.

Part II–Financial Data

(Includes items 4 to 6 of the survey questionnaire)

Note: The dollar amounts reported on this form should reflect actual expenditures for the year. All financial data requested should be reported in thousands of dollars; for example, an expenditure of $25,250 should be reported in the appropriate column as $25.

Item 4–Total Expenditures. Report all expenditures of your organization during the 1969 accounting period. These include all expenditures for current operations and administration of the organization; buildings and equipment; and all gifts, grants, contracts, scholarships, etc., made to outside organizations and individuals in the United States and foreign countries, and the administrative and operating expenses associated with such disbursements.

4a. *Current R&D Expenditures*–Include all direct and indirect operating costs incurred for intramural R&D performance. The major relevant costs usually include wages and salaries of all supporting personnel such as technicians, secretaries and other personnel, costs of administration, costs of materials and supplies consumed, service and supporting costs, depreciation, and shares of other overhead expenses. Include the cost of research and development performed by scientists and engineers directly employed by your organization, whether done in the United States or abroad. If your organization performed research and development for others on contract, include the total charged for the work performed in the year covered by the survey. *Exclude R&D contracts subcontracted by your organization to be performed by other organizations.* Also, exclude the gathering of general-purpose data, activities concerned primarily with the dissemination of scientific information.

4b. *Capital R&D Expenditures*–Report all capital expenditures during the year covered by the survey for building, fixtures, and depreciable equipment used in research and development performed within your organization. Include only costs which are normally chargeable to fixed asset accounts for which depreciation accounts are ordinarily maintained; *include* major alterations, capitalized repairs and improvements; *include* expenditures made during the year for establishments under construction but not yet in operation. Do not include capital expenditures made by owners of property rented or leased by you, including the Federal Government. *Exclude* cost of land and cost of maintenance and repair charged as current operating expense. Also *exclude* costs of government-owned structures or equipment.

4c. *All Other Expenditures*–Include all other expenditures by your organization except those already listed in 4a and 4b. Include in this category extramural R&D expenditures.

Item 5–Current Expenditures for Research and Development, by Source of Funds, 1969. Source of funds refers to immediate sources rather than ultimate sources of funds concerned. For example, funds received by your institution from a foundation should be reported under that source, even if industry was the original source of some or all of the foundation's funds.

5a. *Federal Government*–Include grants and contracts earmarked for research and development by all agencies of the Federal Government. In reporting Federal funds for research and development, include those Federal funds channeled through State agencies. *Exclude R&D contracts subcontracted by your institution to be performed by other organizations.*.

5b. *State Government*–Include funds designated for R&D by the State government and its agencies.

5c. *Local Government*–Include funds designated for R&D by county, municipal, or other local governments and their agencies.

5d. *Foundations*–Include grants and contracts earmarked for R&D by nonprofit philanthropic foundations and trusts not affiliated with your institution, such as the Carnegie, Ford, Kresge, or Rockefeller Foundations. Funds from foundations which are affiliated with, or grant solely to, your institution should be included under *Institution's own funds*.

5e. *Voluntary Health Agencies*–Include grants and contracts specified for R&D by voluntary health agencies, such as the American Cancer Society and the American Heart Association. Funds specifically designated for R&D and derived from a health agency that is a unit of a State or local government should be reported under *State* or *local government*. Funds from professional societies such as the American Medical Association and the American Dental Association should be reported under *Other sources*.

5f. *Industry* (including trade associations)–Include all grants and contracts allocated to R&D by profit-making organizations, whether engaged in production, distribution, research, service, or other activities. Do not include grants and contracts from nonprofit foundations financed by industry, which should be reported under *Foundations*.

5g. *Institution's Own Funds*–Include earnings from investments, disbursements from capital, membership dues and assessments, liquidation of assets, unrestricted contributions and gifts from private individuals, and earnings from miscellaneous sources such as publication sales, admissions, advertising, etc.

5h. *Other Sources*–Report any additional funds received from outside sources other than those already noted, and which were earmarked for R&D *by the source*. Examples include gifts, grants, or contracts received from private individuals or professional societies, and designated for R&D by them.

Item 6–Current Expenditures for Research and Development, by Field of Science, 1969. Report expenditures by field of science in accordance with *Classification of Fields* on page 2.

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APPENDIX D

List of Federally Funded Research and Development Centers Administered by Nonprofit Organizations

Department of Defense

Institute for Defense Analyses
Human Resources Research Organization
Research Analysis Corporation
Aerospace Corporation
Analytic Services, Inc.
Electromagnetic Compatibility Analysis Center
MITRE Corporation
RAND Corporation

Department of Health, Education, and Welfare

Appalachia Educational Laboratory
Center for Educational Policy Research
Center for Urban Education
Central Midwestern Regional Educational Laboratory
Eastern Regional Institute for Education
Education Development Center, Inc.
The Far West Laboratory for Educational Research and Development
Mid-Continent Regional Educational Laboratory
Northwest Regional Educational Laboratory
Policy Research Center
Regional Educational Laboratory for the Carolinas and Virginia
Research for Better Schools, Inc.
Southeastern Educational Laboratory
Southwest Educational Development Laboratory
Southwest Regional Educational Laboratory
Southwestern Cooperative Educational Laboratory
Upper Midwest Regional Educational Laboratory, Inc.

Atomic Energy Commission

Atomic Bomb Casualty Commission
Pacific Northwest Laboratories

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